

# DRUK GREEN POWER CORPORATION LIMITED

## PROFILE



Promote, develop and manage renewable energy projects, particularly hydropower, in an efficient, responsible and sustainable manner, and to maximise wealth and revenues to the nation

## MISSIONS

- ✿ Effectively and efficiently manage hydropower plants, and maximise returns to the shareholder
- ✿ Take a lead role in accelerating hydropower development in the Kingdom by developing new hydropower projects independently through joint ventures, or through any other arrangements with domestic and international partners
- ✿ Provide energy security for domestic consumption, fuel economic growth, and also explore other forms of renewable energy other than hydropower
- ✿ Build capacity in hydropower development and management through recruitment and training of professionals to meet the current human resources requirements of the company while at the same time ensuring a robust expansion and succession plan
- ✿ Be a responsible, proactive, and progressive company with a highly motivated and dedicated team of professionals

## VALUES

- ✿ Organizational Ownership & Pride
- ✿ Mutual Respect & Trust
- ✿ Initiative & Timely Action
- ✿ Integrity
- ✿ Accountability
- ✿ Work Life Balance
- ✿ Social & Environmental Responsibility

## COMPANY PROFILE

Druk Green Power Corporation Limited (DGPC), a subsidiary of Druk Holding and Investments Limited, is the only generation utility in Bhutan. It was formed in December 2007 to develop and manage Bhutan's hydropower resources and assets.

DGPC was established for the effective and optimal utilisation of the abundant water resources to develop water-to-wire expertise amongst the Bhutanese, and to lead in accelerating hydropower development in keeping with the 2021 Sustainable Hydropower Development Policy. Thus, DGPC has ventured into the construction of new hydropower projects, and the establishment of subsidiary companies to provide ancillary services to support its mandates.

Bhutan's total installed capacity stand at 2,453 MW. The expansion of the power industry has been a major factor in the country's socioeconomic development. Thus, hydropower is regarded as the main economic force. Bhutan has been able to attain about 100% grid electricity reach to every family thanks to its affordable and dependable hydroelectric electricity. This has also allowed the country's energy-intensive sectors to flourish, which has spurred economic growth. Bhutan has also been able to export excess electricity and make large profits owing to its hydropower assets.

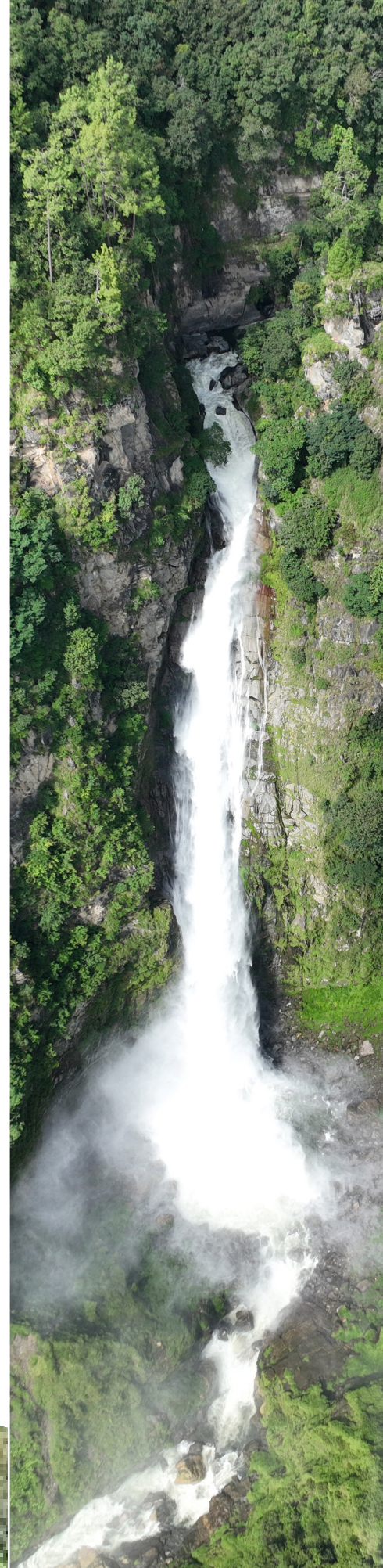
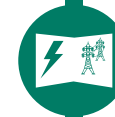
As Bhutan progressed into the 21st century, the country undertook a restructuring of its power sector to accommodate the increasing number of projects and the expanding electricity grid that reached every corner of the nation. This restructuring was facilitated through the implementation of a number of new policies and legislative interventions.

Bhutan Power Corporation Limited was established in 2002 as the transmission and distribution utility catering to domestic demand and providing transmission access for the export of surplus generated power to India.

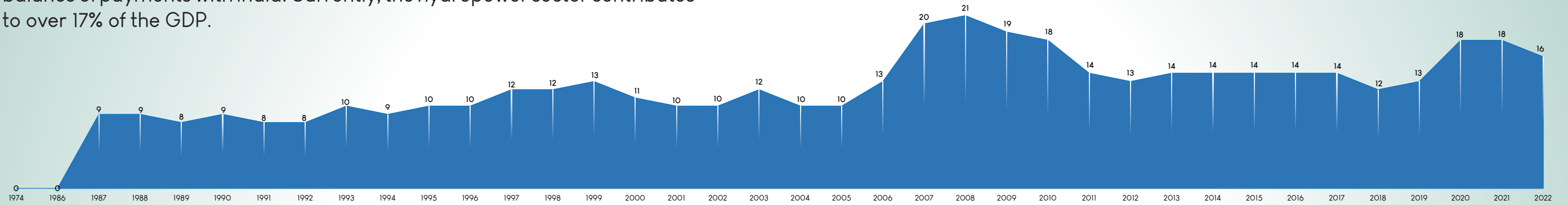
The Electricity Regulatory Authority (formerly known as Bhutan Electricity Authority) was established as the regulatory body.

DGPC was incorporated on December 24, 2007, to consolidate all hydropower assets under a single entity for streamlining operations and strengthen its position in Bhutan's energy and economic landscape.

Today, over 99% of Bhutanese households have access to the grid electricity supply. Availability of reliable and cheap power has bolstered the growth of energy-intensive industries in Bhutan adding value to the electricity generated.



About 70% of the total energy generated is exported to India which constitutes at least 24% of direct revenues to the exchequer and offsets much of the balance of payments with India. Currently, the hydropower sector contributes to over 17% of the GDP.



1986 - 1988

336 MW Chukha Hydroelectric Project commissioned



2002

60 MW Kurichhu Hydropower Project commissioned



2004

64 MW Basochhu Hydropower Project commissioned



2006 - 2007

1,020 MW Tala Hydropower Project commissioned



2008

DGPC incorporated



2012

Dagachhu Hydropower Project commissioned



2015

Khorlochhu Hydro Power Limited incorporated



2019

Mangdechhu hydropower project commissioned



2014

Tangsibji Hydro Energy Limited incorporated



2014

Bhutan Hydropower Services Limited commissioned



2017

Bhutan Automation & Engineering Limited incorporated



2021

Druk Hydro Energy Limited incorporated

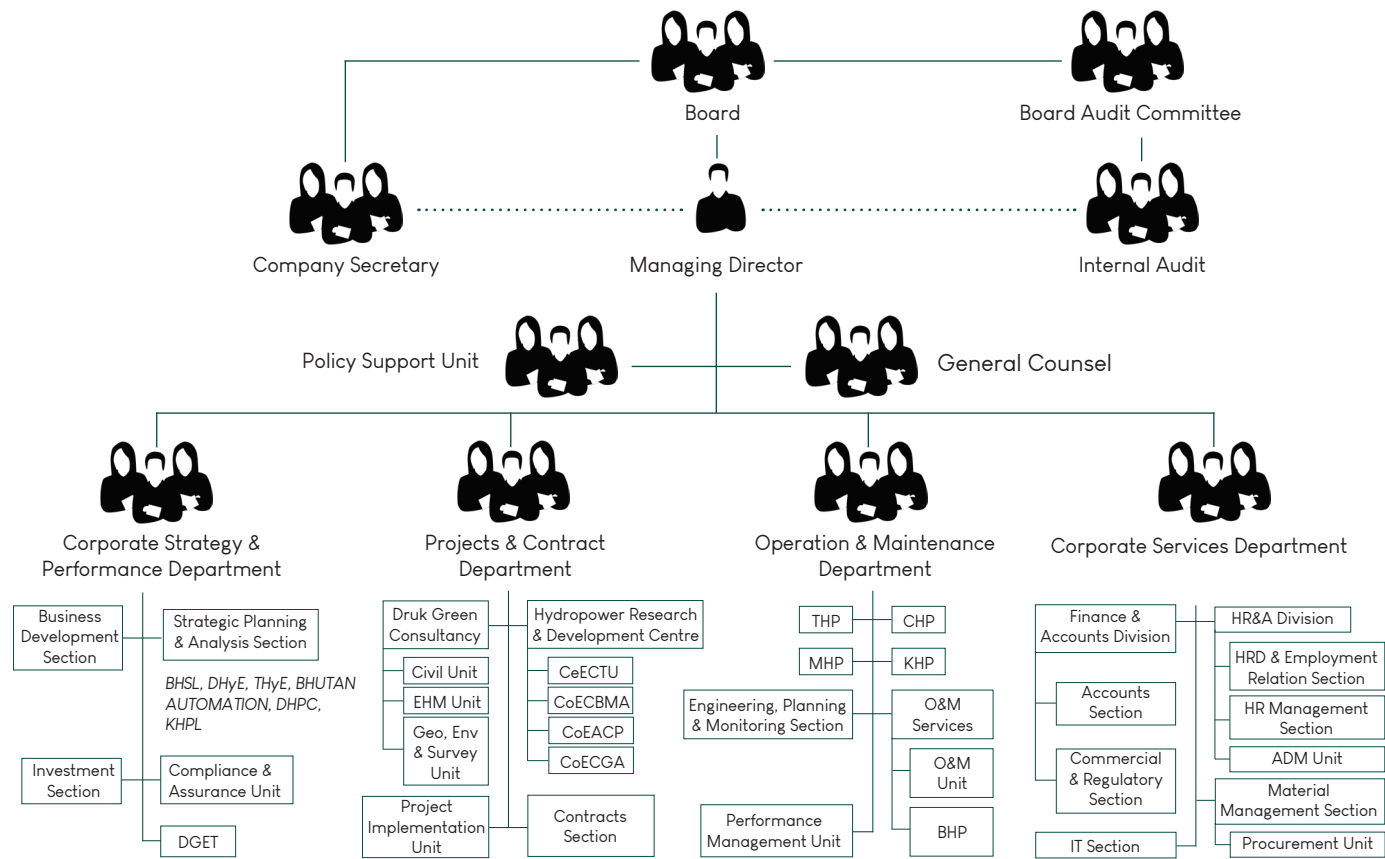


2022

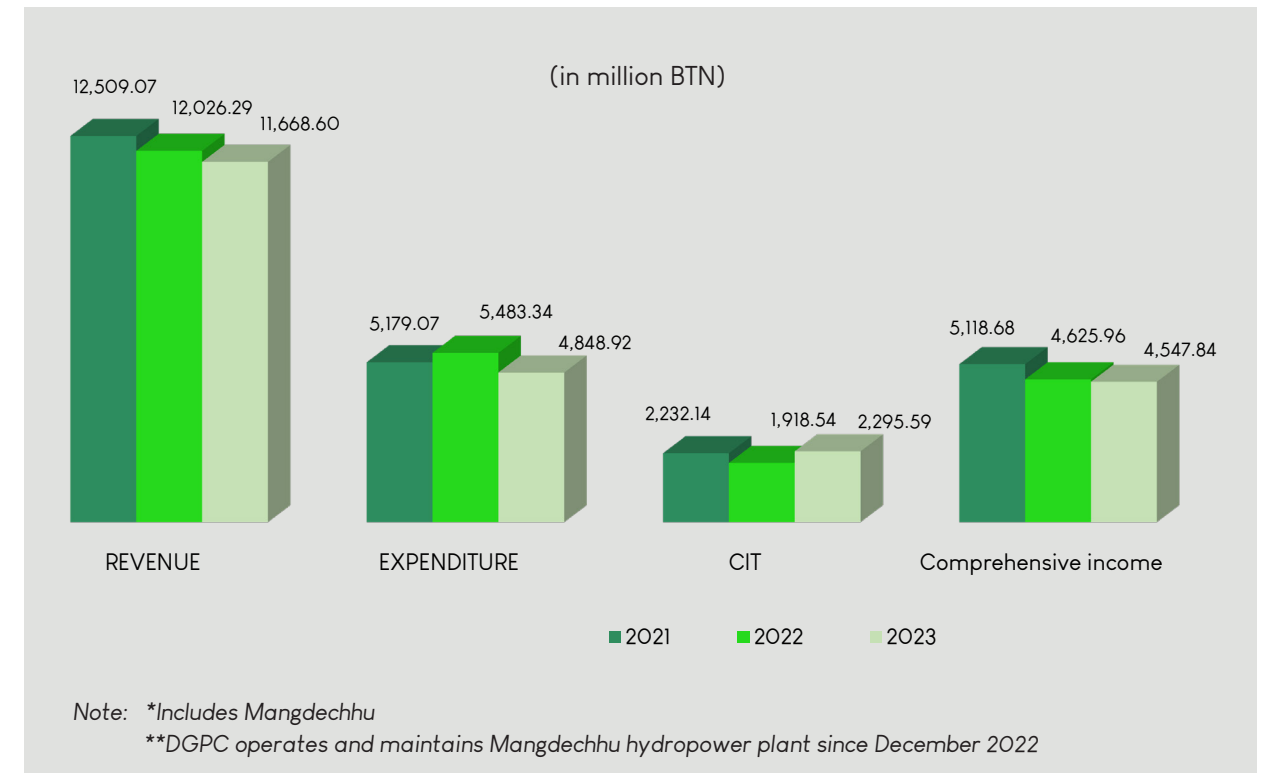
Embedded Generation taken over

Bhutan's economic development is inexplicably linked with the growth of the hydropower sector and hydropower is considered the cornerstone of the Bhutanese economy

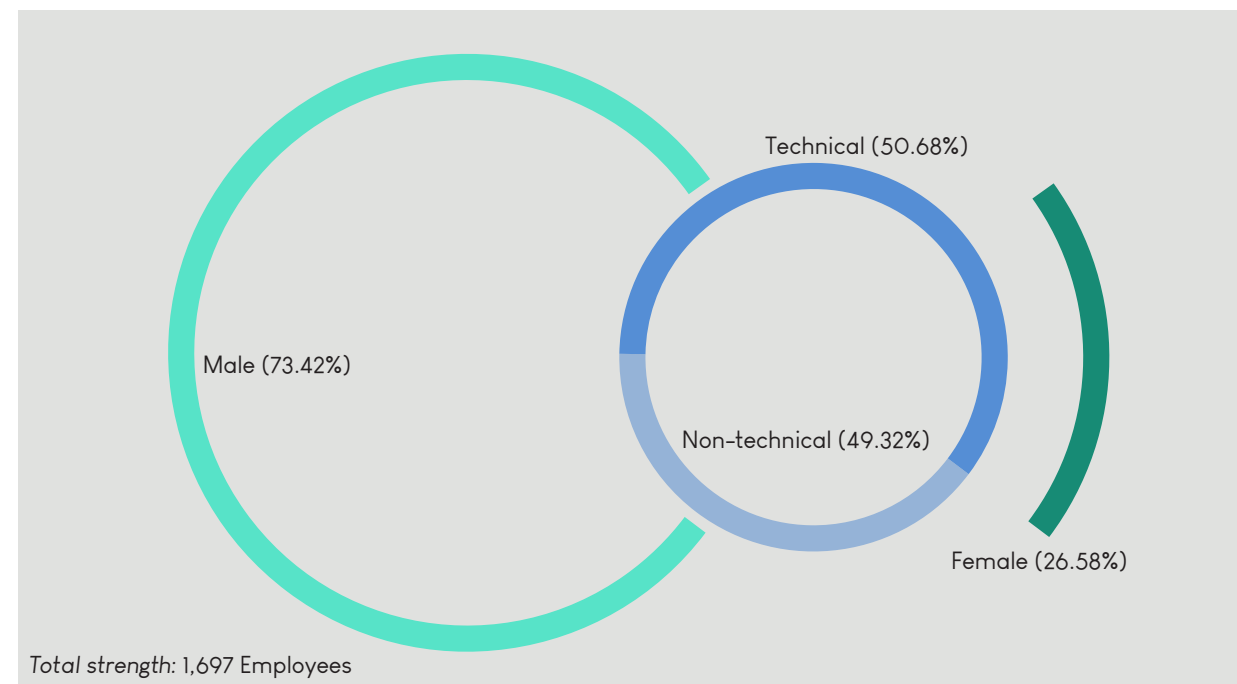
## ORGANOGRAM



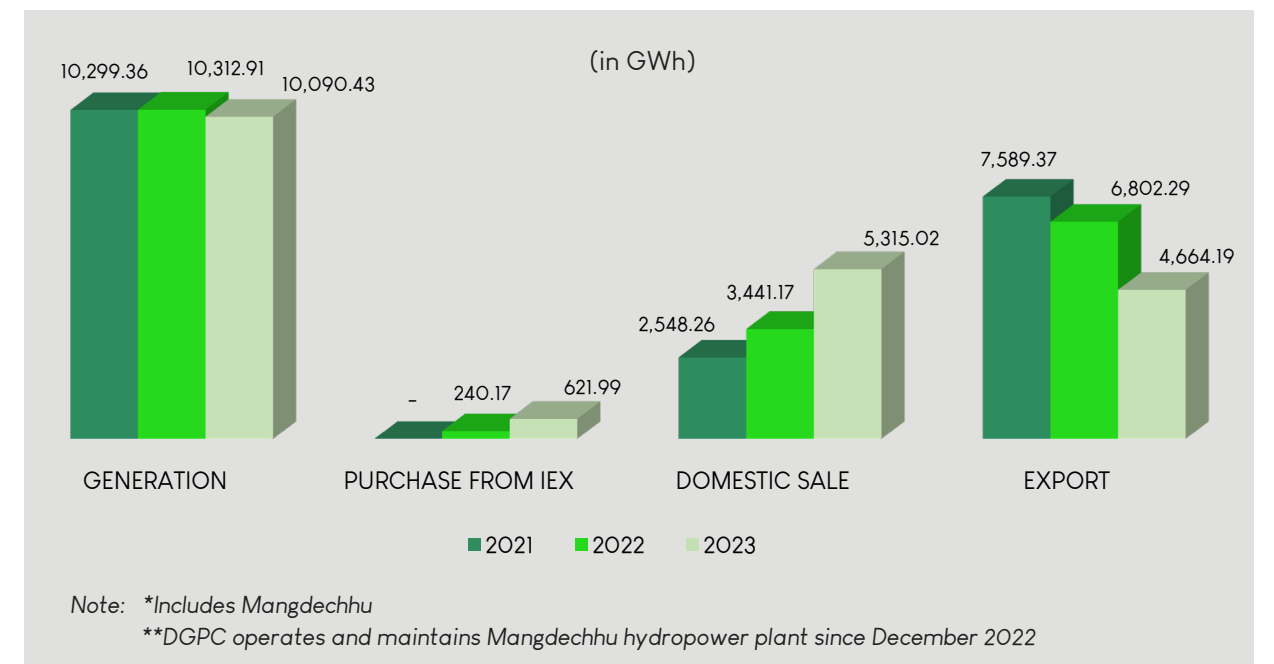
## FINANCIAL HIGHLIGHTS



## OUR TEAM



## OPERATIONAL HIGHLIGHTS



## GENERATING PLANTS

The core of DGPC's business strategy is its hydroelectric assets, which offer consistent hydropower generation with long-term power purchase agreements in place. Additionally, the company makes ongoing, strategic investments in expanding its generation capacity and related hydropower services. Each year, these hydropower resources provide roughly 10,000 million units of electricity.

### 336 MW CHHUKHA HYDROPOWER PLANT



Installed capacity: 4 x 84 MW  
 Design energy: 1,800 GWh  
 Project commissioning: 1986 - 1988

### 60 MW KURICHHU HYDROPOWER PLANT



Installed capacity: 4 x 15 MW  
 Design energy: 400 GWh  
 Project commissioning: 2002

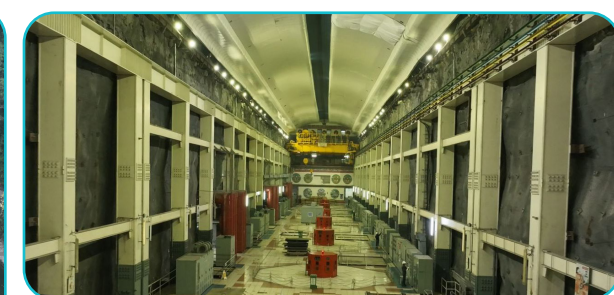
### 64 MW BASOCHHU HYDROPOWER PLANT



|                        | UPPER STAGE | LOWER STAGE |
|------------------------|-------------|-------------|
| Installed capacity:    | 2 x 12 MW   | 2 x 20 MW   |
| Design energy:         | 105 GWh     | 186 GWh     |
| Project commissioning: | 2001        | 2004        |

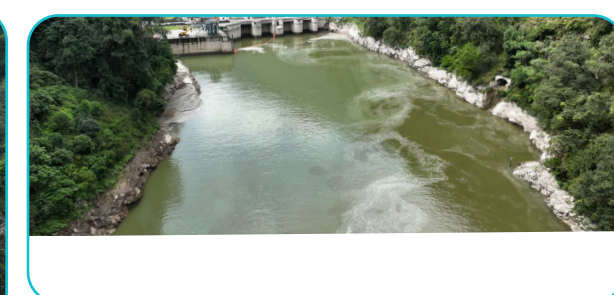
The run-of-the-river nature of the hydropower assets results in a significant decrease in generation during the cold winter months. The majority of the winter energy available is used by Bhutan, with the extra energy from the summer being sold to India. In addition, DGPC handles bulk imports during months of energy shortage and exports of summertime surplus power. A portion of the annual balance of payments with India is countered by the profits from the export of power to that country.

### 1,020 MW TALA HYDROPOWER PLANT



Installed capacity: 6 x 170 MW  
 Design energy: 3,962 GWh  
 Project commissioning: 2006 - 2007

### 720 MW MANGDECHHU HYDROPOWER PLANT



Installed capacity: 4 x 180 MW  
 Design energy: 2,925 GWh  
 Project commissioning: 2019

### 9 MW EMBEDDED GENERATION



Installed capacity: 9 MW  
 mini/micro hydropower plants, wind and solar plants

## SUBSIDIARY/JOINT VENTURE COMPANIES

### BHUTAN HYDROPOWER SERVICES LIMITED



Business scope: State-of-the art, repair and manufacturing of hydro turbine runners and associated components

Project cost: Nu. 1,137 million

Incorporation: October 23, 2012

COD: September 30, 2014

Shareholding: DGPC (100%)



### DRUK HYDRO ENERGY LIMITED



Business Scope: To construct and commission small and medium hydropower projects

Incorporation: December 16, 2021

Shareholding: DGPC (100%)



### TANGSIBJI HYDRO ENERGY LIMITED



Installed capacity: 2 x 59 MW

Design energy: 420 GWh

Project estimated cost: Nu. 14 billion

Incorporation: April 25, 2014

COD: January 2024

Shareholding: DGPC (100%)



### DAGACHHU HYDRO POWER CORPORATION LIMITED



Installed capacity: 2 x 63 MW

Design energy: 515 GWh

Project cost: Nu. 13 billion

Incorporation: May 13, 2008

COD: February 2015

Shareholdings: DGPC (59%), Tata Power (26%), NPPF (15%)



### KHORLOCHHU HYDRO POWER LIMITED



Installed capacity: 4x 150 MW

Design energy: 2,569 GWh

Project estimated cost: Nu. 67.59 billion

Incorporation: June 12, 2015

Shareholdings: DGPC (60%), Tata Power (40%)



### BHUTAN AUTOMATION & ENGINEERING LIMITED (BHUTAN AUTOMATION)



Business scope: Manufacturing of automation systems for hydropower plants

Project cost: Nu. 60 million

Incorporation: November 8, 2017

Shareholdings: DGPC (51%), Andritz Hydro (49%)





## HYDROPOWER DEVELOPMENT

DGPC has more than 50 years of experience in the construction, operation and maintenance of hydropower plants starting with the experience gained from the Chhukha hydropower plant and embedded generation.

Dagachhu project was developed by a complete Bhutanese management, and contributes directly to Bhutan's carbon neutral efforts and helps offset the regional carbon footprints through export. Nikachhu and Khorlochhu projects follow similar management styles.

Further, recognising the need for domestic energy security through facilitation of self-contained supply flexibility for each dzongkhag to meet the domestic demand and to ensure essential services in times of exigencies, DGPC is also undertaking strategic planning and implementation of a backup power supply system through construction of small and medium sized hydropower projects via its subsidiary company Druk Hydro Energy Limited.



## DRUK GREEN CONSULTANCY SERVICES (DGC)

- ✿ Engineering & design
- ✿ Environmental, social & cdm studies
- ✿ Detailed survey & investigation
- ✿ Geological & geotechnical investigation
- ✿ River basin studies
- ✿ Cost engineering & financial analysis
- ✿ Equipment planning & management
- ✿ Renovation, modernisation & uprating of hydropower plants
- ✿ Dam safety



## PROJECTS COMPLETED

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## ONGOING PROJECTS

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## HYDROPOWER RESEARCH & DEVELOPMENT CENTRE (HRDC)

- ✿ Centre of Excellence for Condition Based Monitoring (CoECBM)
  - ✿ Chemical Testing & Analysis (CTA)
  - ✿ Condition Based Mechanical Assessment (CBMA)
- ✿ Centre of Excellence for Automation, Control and Protection (CoEACaP)
- ✿ Centre of Excellence for Civil and Geotechnical Engineering (CoECGE)





## HYDROPOWER ANCILLARY SERVICES

The ancillary hydropower services are key to supporting the main hydropower business. With the establishment of BHSL, and consolidation of CoEs to a research and development function, DGPC is in a position to offer a critical portfolio in a wide range of specialised services.

### BHUTAN HYDROPOWER SERVICES LIMITED

BHSL operates a state-of-art Hydropower Service Center for reclamation and manufacturing of hydro runners and allied underwater components. Some of the specialisation includes:

- ✿ Manufacture of runners
- ✿ Repair of runners and other underwater components
- ✿ Manufacture of Hydro-Mechanical components and penstocks



**Business scope:** State-of-the art facility for repairing and manufacturing hydro turbine runners and associated components  
**Project cost:** Nu. 1,137 million  
**Incorporation:** October 23, 2012  
**COD:** September 30, 2014  
**Shareholding:** DGPC (100%)

### BHUTAN AUTOMATION & ENGINEERING LIMITED (BHUTAN AUTOMATION)

BHUTAN AUTOMATION specialises in the design, engineering, manufacturing and implementation of state-of-the-art automation systems and other secondary equipment for industrial applications. The main services provided by BHUTAN AUTOMATION include:

- ✿ Design and engineering of Industrial Automation Systems
- ✿ Erection, Testing and Commissioning of automation works



**Business scope:** Manufacture automation systems for hydropower plants  
**Project cost:** Nu. 60 million  
**Incorporation:** November 8, 2017  
**Shareholding:** DGPC (51%), Andritz Hydro (49%)



## PROJECTS UNDER CONSIDERATION

Under Phase III, DGPC is considering developing four much larger hydropower projects – 85 MW Gamri II, 363 MW Khomachhu, 170 MW Dangchhu and 900 MW Wangchhu Storage.

Further, DGPC is exploring more climate resilient and sustainable hydropower schemes such as pumped storage and seasonal storage hydropower schemes. The update of the detailed project reports for several large hydropower projects such as the 1,125 MW Dorjilung project, 180 MW Bunakha project, and the 404 MW Nyeru Amari I & II are being taken up. DGPC is also preparing the detailed project report for the integrated 740 MW Gongri Reservoir and 1,800 MW Jerrichhu Pump Storage scheme.

## DEVELOPMENT OF OTHER RENEWABLES

Under other renewables, Bhutan has started the implementation of a 17 MW solar farm.

We have ventured in to other renewable energy sources such as solar and wind mainly to supplement power supply during the lean season. DGPC has initiated implementation of solar photovoltaic utility projects as well as rooftop solar projects in many government agencies. In line with this, we have set an ambitious target to install 1,000 MWp solar projects by 2030 and another 4,000 MWp by 2040.



## BHUTAN'S RENEWABLES ROADMAP

With a rapidly expanding domestic market and supply demand profiles that match India's, Bhutan's hydropower industry has a secure export market for its summer excess. In the winter however, the hydropower facilities' current firm electricity production capacity is a mere 415 MW. Bhutan's peak demand exceeded this firm generation capacity starting in the winter of 2022, forcing the country to buy power from India.

The shortage in supply from domestic generation is anticipated to persist even with the hydroelectric projects now under development, which are anticipated to come online in the next four to five years. This is especially true in November through May, when demand outpaces the expansion of generation capacity. In addition to pursuing access to financing and India's energy markets with the Government of India, Bhutan has outlined plans for the accelerated development of hydro-solar hybrid generation projects in order to guarantee that domestic demand is met by the country's own energy resources and that there is an export market for the summer surplus.

Bhutan is looking at the potential of the regional market as outlined in Bhutan's Renewable Energy Development Roadmap 2024 that sets an ambitious plan to accelerate the development of hydropower and solar projects. By 2040, Bhutan envisages to add another 15,000 MW in hydro generation capacity and a further 5,000 MW in solar generation capacity.

- Phase I** Construction of 54 MW Burgangchhu in Zhemgang, 32 MW Yungichhu in Lhuentse and 18 MW Suchhu in Haa started in 2022 and is expected to commission by 2024 – 2025
- Phase II** Feasibility studies of 26 MW Druk Bindu I & II, 54 MW Gamri I, 90 MW Jomori and 25 MW Begana Integrated projects have been completed; projects are expected to be commissioned between 2026 and 2027
- Phase III** 85 MW Gamri-II-PFS, 24 MW Yurmochhu, 53 MW Sherichhu, 64 MW Jigmechhu, 33 MW Parochhu
- Phase IV** 363 MW Komachhu, 170 MW Dangchhu, 237 MW Jongthang



## ENVIRONMENT AND SUSTAINABILITY

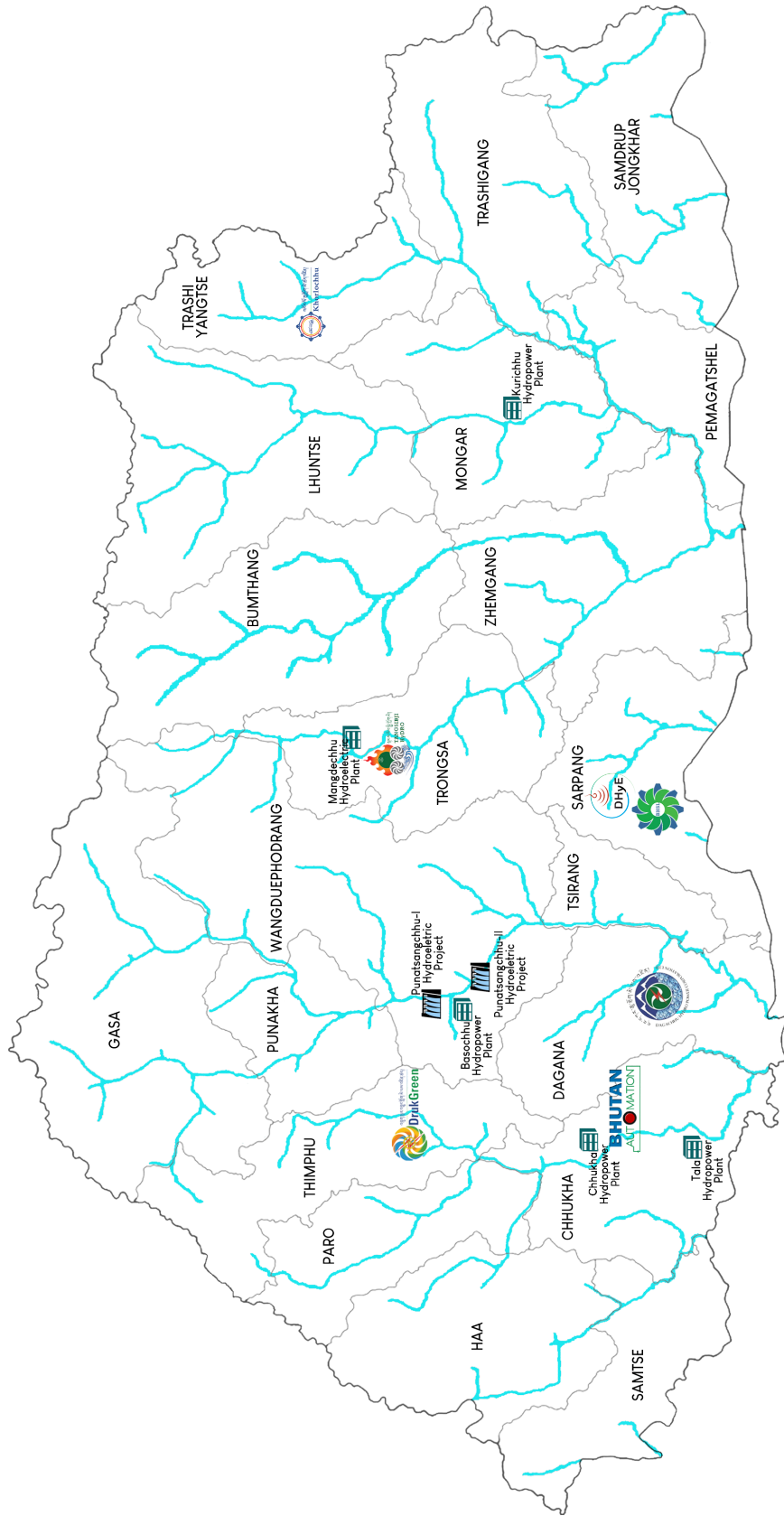


DGPC is committed to developing renewable energy projects sustainably in line with the international best practices on environmental and social standards and safeguard policies.

DGPC supports social and community vitality through various initiatives of its own and also in collaboration with other partners. DGPC recognises the importance of the protection of catchments as it provides steady precipitation – a perennial source of water for the river system. Further, preservation of the catchments reduces soil erosion, which would otherwise decrease the life of underwater equipment of DGPC plants.

Access to reliable and affordable hydropower has stimulated growth in other sectors of the Bhutanese economy such as the growth of the domestic industries in the country.

# BHUTAN (HYDROPOWER) MAP



To achieve Bhutan's vision of hydropower development, huge investments of over USD 8 billion will be required over the next decade considering present construction cost estimates.

## GENERATING POWER PLANTS

Basochhu Hydropower Plant  
Wangduephodrang  
Tel: +975 2 471021

Chhukha Hydropower Plant  
Chhukha  
Tel: +975 5 290060

Kurichhu Hydropower Plant  
Mongar  
Tel: +975 4 744100

Mangdechhu Hydropower Plant  
Trongsa  
Tel: +975 3 528031

Tala Hydropower Plant  
Gedu  
Tel: +975 77182006

## SUBSIDIARY AND JV COMPANIES

Dagachhu Hydro Power Corporation Limited  
Dagana  
Tel: +975 17116167  
[www.dagachhu.com](http://www.dagachhu.com)

Tangsibji Hydro Energy Limited  
Trongsa  
Tel: +975 3 521653/54  
[www.thye.bt](http://www.thye.bt)

Bhutan Hydropower Services Limited  
Jigmeling  
Tel: +975 6 252777  
[www.bhsl.bt](http://www.bhsl.bt)

Khorlochhu Hydro Power Limited  
Trashiyangtse  
Tel: +975 8 781139/44  
[www.khepbhutan.com](http://www.khepbhutan.com)

Bhutan Automation & Engineering Limited  
Chhukha  
Tel: +975 5 290026  
[www.bhutanautomation.com](http://www.bhutanautomation.com)

Druk Hydro Energy Limited  
Sarpang  
email: [info.dhye@dhye.bt](mailto:info.dhye@dhye.bt)  
<http://dhye.drukgreen.bt>



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