

Nepal Electricity Authority

# **GENERATION DIRECTORATE**

**11<sup>th</sup> Issue**

August 2019 ( Bhadra, 2076)  
Durbar Marg, Kathmandu, Nepal



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## MESSAGE FROM THE MANAGING DIRECTOR



It's my great pleasure to extend heartfelt greetings to the publication of 11th edition of NEA "Generation Directorate" magazine on the occasion of 34th annual day of Nepal Electricity Authority by Generation Directorate. I believe that this magazine will provide useful as well as precious data to the public.

NEA Generation has fulfilled around fifty percent of system peak load by its 19 hydropower and two thermal power plants. From last year, long awaited 30MW Chameliya HEPS is generating power. This year, NEA has completed its 60MW Upper Trishuli 3A HEP which is generating power in testing mode. 14 MW Kulekhani III HEP is under final stage of completion. Hence NEA generation will be able to supply more support to the national grid and I hope this will help us for enhancing our quality of power supply and support for significant growth of National Economy. Likewise almost power plants are running in their optimal capacity with proper scheduled maintenance & overhauling taking minimum shutdown time to minimize the generation loss. Major power plants like Kaligandaki A, Middle Marsyangdi, Marsyangdi, Sunkoshi HEP have generated energy more than the target. I'm thankful to the employees working in different generation power plants, plant managers and the team in Generation Directorate.

Finally, I would like to thank to the publication team of this publication who worked appreciably in short time frame.

Kul Man Ghising

Managing Director



## MESSAGE FROM THE DEPUTY MANAGING DIRECTOR



I'm so glad that Generation Directorate is publishing its 11th edition of NEA GENERATION magazine on the occasion of our 34th annual day of Nepal Electricity Authority (NEA). I believe, this magazine will be able to highlight the actual scenario of NEA owned power plants and under construction projects and its related activities to the public.

We together have tried our best for the maximum electricity generation with periodic and scheduled maintenance activities. We always considered "Prevention is better than Cure" for best handling of our power plants and equipments. To cope up this slogan, we have planned and done the maintenance activities of power plants with minimal generation loss by doing unit and plant shutdown in dry season with minimum duration and utilizing maximum effort of available technical manpower and resources. We have completed 30 MW Chameliya HEP in last year. 60MW Trishuli 3A HEP have just started the generation and is connected to national grid as a trial operation after testing from both units and will be in commercial operation hopefully within second week of Bhadra 2076. 14MW Kulekhani III HEP is in final stage of completion.

I'm very proud and thankful to the employees under Generation Directorate who have worked being 24 hr available in spite of any adverse conditions and situations like; raining, flooding, festival, weekend, or holidays everywhere in power plants or in directorate/department office. With this hard work and dedication, major power plants of NEA like Kali Gandaki 'A' (KGA), Middle Marsyangdi (MMHPS), Marsyangdi (MHPS) and Sunkoshi (SHPS) Hydropower Stations has crossed their annual generation compared to the assigned target. Even the seasonal storage power plants, Kulekhani-I & Kulekhani-II have reached the maximum water level and generation in similar way.

At last but not the least, I would like to express my sincere gratitude to the NEA Board, Chairman and Managing Director for their valuable guidance, support and boosting the moral of every employees and Operation & Maintenance team of power plants.

Madan Timsina  
Officiating Deputy Managing Director



## Executives



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Officiating DMD, Generation Directorate  
Director, Large Generation O&M Department



Mr. Chandra Shekhar Chaudhary

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Medium Generation O&M Department



Mr. Fanendra Raj Joshi

Chief  
Upper Trishuli 3A Hydropower Project



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Chief  
Generation Development Department



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## STATION CHIEFS



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Kaligandaki "A" Hydropower Station



**Pashupati Raj Gautam**  
Middle Marsyangdi Hydropower Station



**Badri Foyal**  
Marsyangdi Hydropower Station



**Ram Kumar Yadav**  
Kulekhani -I Hydropower Station



**Avash Ojha**  
Kulekhani -II Hydropower Station



**Pradeep Singh**  
Chameliya Hydropower Station



**Sunil Kumar Chaturvedi**  
Multifuel Power Station



**Tara Datt Bhatta**  
Trishuli Hydropower Station



**Mr. Suraj Dahal**  
Devighat Hydropower Station



**Mr. Kapil Dev Manjan**  
Gandak Hydropower Station



**Mr. Shiv Kumar Shah**  
Modikhola Hydropower Station



**Mr. Surendra karki**  
Hetauda Diesel Centre



**Gir Bahadur K.C**  
Sunkoshi Hydropower Station



**Mr. Prahlad Raut**  
Puwakhola Hydropower Station



**Mr. Binod Prasad Pandey**  
Chatara Hydropower Station



**Mr. Shiva Kumar Thapa**  
Panauti Hydropower Station



**Mr. Harish Chandra Dhital**  
Setifewa Hydropower Station

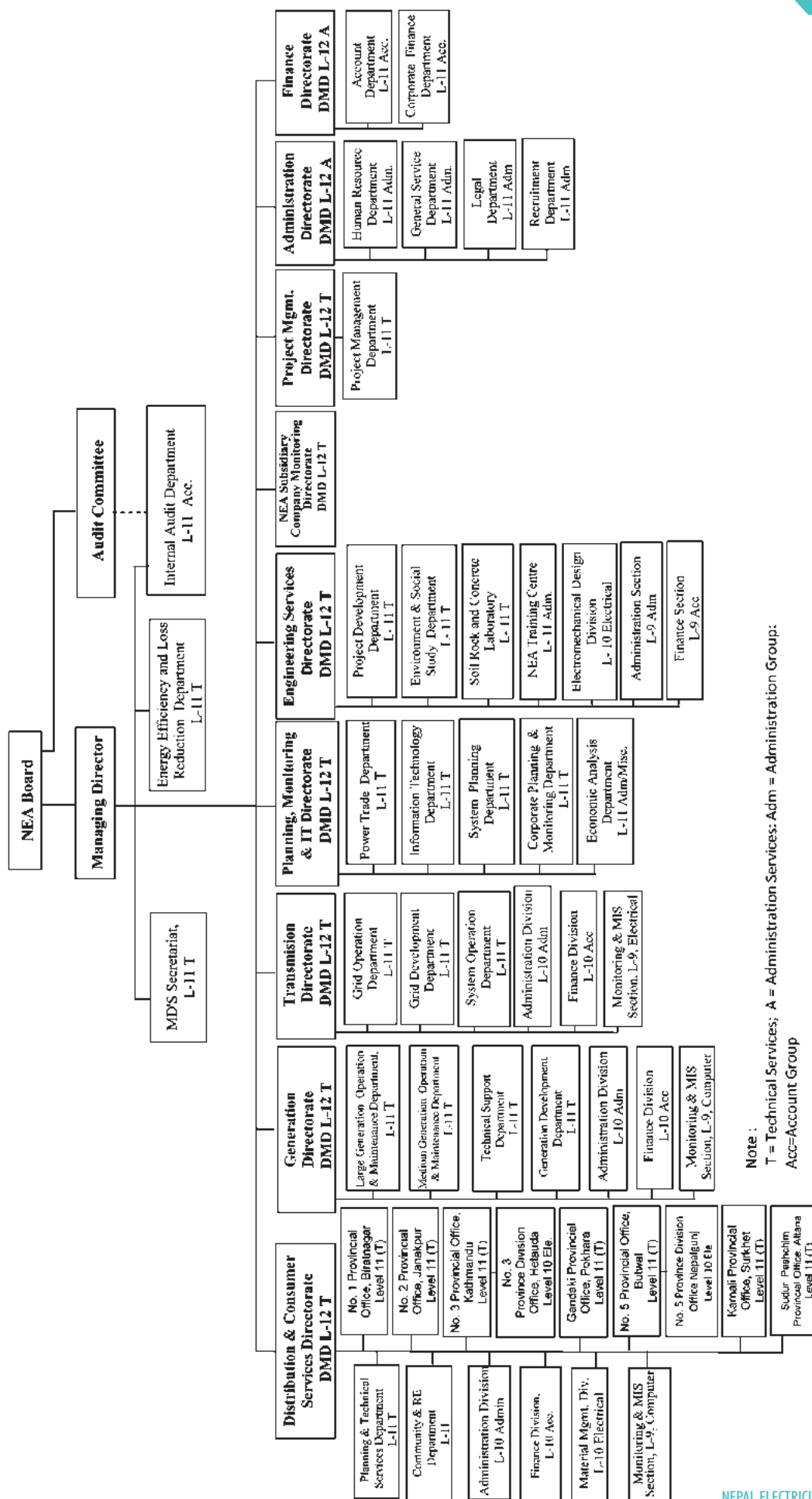


**Mr. Mohammad Safid**  
Sundarijal Hydropower Station



**Mr. Shyam Krishna Basnet**  
Pharping Hydropower Station

# ORGANIZATIONAL STRUCTURE OF NEA



Note :

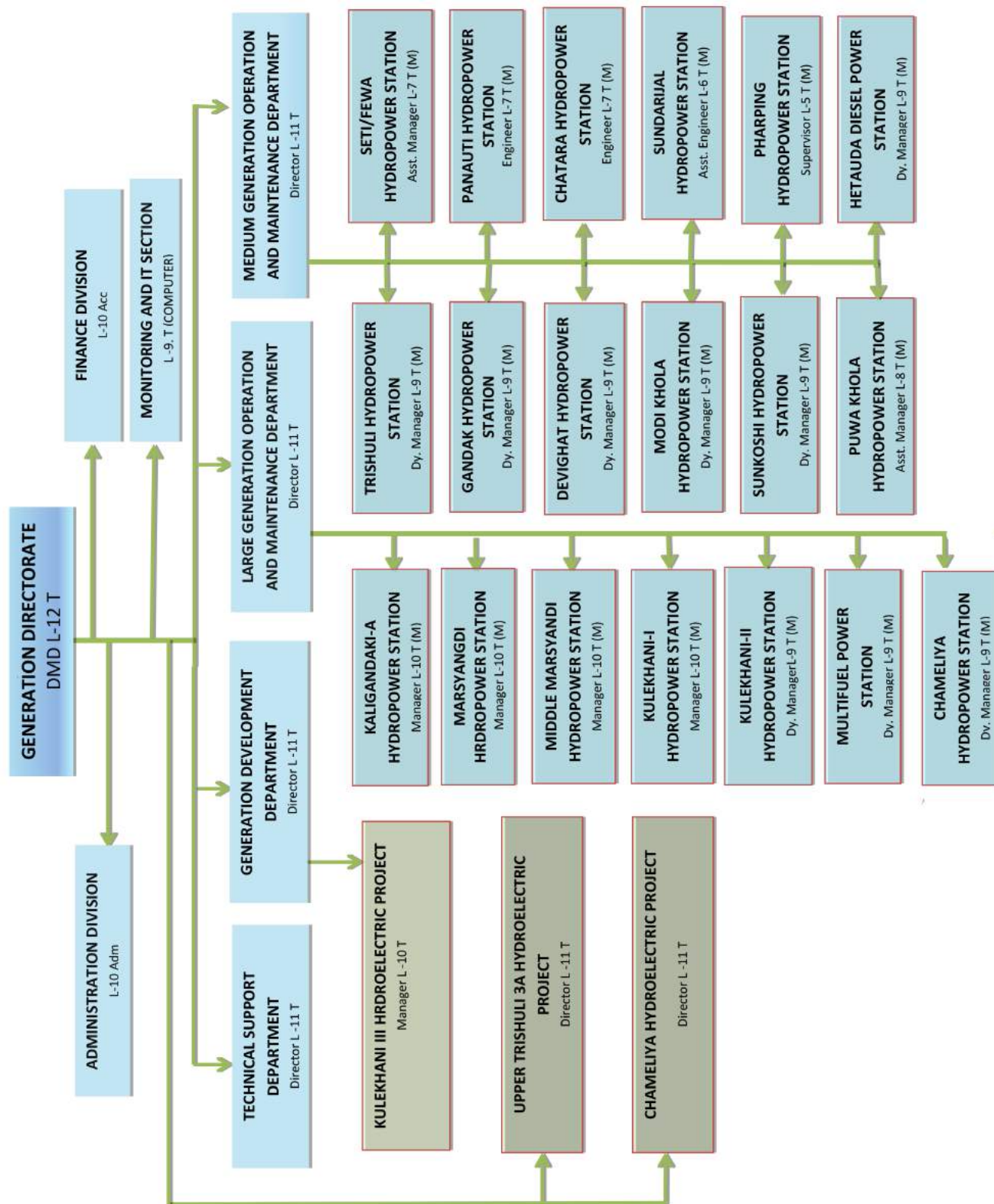
T = Technical Services; A = Administration Services; Admin = Administration Group;

Acc=Account Group





# CORPORATE STRUCTURE OF GENERATION DIRECTORATE







# GENERATION DIRECTORATE

## BRIEF OVERVIEW

Generation directorate, headed by Deputy Managing Director is responsible for the construction of the new power generation projects together with optimum operation and maintenance of the hydropower stations owned by Nepal Electricity Authority (NEA). Currently there are 2 under construction hydropower projects, eighteen (18) hydropower stations and two (2) thermal power plants under this directorate. 'Generation of energy by optimally utilizing the resources available while undertaking periodic overhauling, major maintenance works and rehabilitation projects of the generating stations'; that approximately describes the mission of the Generation Directorate.

108 years have been passed since 1911; Nepal started producing hydro-electricity from Pharping power station. The erstwhile "BIJULI ADDA" has found its continuity in various forms of government agencies and is presently the Nepal Electricity Authority. In this way, Generation business can be called to possess the heritage of 108 years of operation and maintenance of power generation stations.

The total installed capacity of hydropower stations and thermal power plants under this directorate now has reached 559.29 MW and 53.41 MW respectively. This Business Group is structured into four departments and three divisions, namely, 1) Large Generation Operation & Maintenance Department 2) Medium Generation Operation & Maintenance Department 3) Technical Support Department 4) Generation Development Department and divisions accordingly are 1) Finance Division 2) Administration Division 3) Monitoring and

MIS Section along with the management of generation construction projects namely Upper Trishuli 3A (60 MW) and Kulekhani-3 (14 MW) under construction project is under the Generation Development Department.

## OPERATIONAL & MAINTENANCE ACTIVITIES

Last year Chameliya Hydropower Project was completed and added 30MW of power in National grid system. Kulekhani III (14MW) is on the phase of completion very soon. 60MW Trishuli 3A HEP has just started the generation and is connected to national grid as a trial operation after testing from both units and will be in commercial operation hopefully within second week of Bhadra 2076. Then total installed capacity under this directorate will reach 626.7 MW in this FY.

Despite this, the whole team under Generation Directorate has strived to increase total production of energy as compared to previous years, due to high operation cost and sufficient power generation from NEA as well as IPPs and power purchased from India, this year we had run Hetauda Diesel plant for testing purpose only and had not run Multifuel power plant. In this FY 2075/76 total generation from the hydropower plants including Upper Trishuli 3A under this directorate is 2541.116 GWh as compared to total target of 2536.840 GWh and last fiscal year (2074/75) generation was 2296.220 GWh. Hence this year's generation has exceeded 0.17 % of the target and 10.67% higher as compared to last year's generation. Improved operation and maintenance practices of this year has resulted the increase in generation from the hydropower stations which eventually contributed for the load shedding minimization and to meet the demand



of consumer. Power plants like Kaligandaki 'A', Middle Marsyangdi and Marsyangdi were operated in their full capacity in peak time during dry season and due to dry seasonal rain in Falgun, Chaitra, Baisakh and Jestha this year Kaligandaki, Middle Marsyangdi, Marsyangdi and Sunkoshi have crossed the 100% generation target. Similarly, Middle Marsyangi had generated the till date maximum energy generation and exceeded the record of generation of all previous years. The time for machine overhauling under scheduled maintenance was managed and spill energy also minimized. As in the previous years the experts' team from different power houses were arranged and made a complete technical experts team for maintenance and overhauling. Co-ordinated maintenance scheduling among the plants was efficiently carried out and operational practices were improved to get higher output. This year, the plant shutdown duration required by Indian irrigation authority for headworks and canal maintenance was continued for Gandak Hydropower Station.

The Generation Directorate has continued to work on the repair and maintenance activities, periodic overhauling and rehabilitation projects under NEA's own funding and with assistance with Government of Nepal and multilateral agencies in some cases. Sundarijal HPS is under rehabilitation under ADB financing. This year Kaligandaki A has successfully completed MIV modification of unit no. 2 and the bidding of SCADA & plant control system is in the installation phase. Also Puwakhola HPS and Seti HPS are on the final stage of SCADA purchasing. Budget has allocated for SCADA system in Kulekhani I and II and repair work of SCADA system is on the process at Modikhola, Devighat and Sunkoshi HES.

In this FY 2075/76 we have started to install AMR/AMI System for CT Operated energy meters installed in HPS & Substations with the coordination of AMI project under DCS Directorate. Rest of the electromechanical as well as old and not functioning meters in all the HPS are being replaced simultaneously. Also HPS Employees Enhanced

Performance Reward (EPR) software will be going to upgrade and will start in all the power stations from the next F/Y 2076/77. Centralized e-attendance is going to be implemented very soon with the coordination to IT Department in all the HPS so that Over Time and shift duty schedule can be managed digitally through software.

## ADMINISTRATION DIVISION

Administration division is responsible for the management of employees under the generation directorate and concerned offices in coordination with the central human resource department as per the approved positions. With the belief of right man in right place, this division also transfers or intra-group transfers of employees with the approval of Deputy Managing Director and keeps record of the employees in offices liable to the directorate.

In order to prepare professionally competent staff, this division manages service related skill enhancement trainings for capability accretion of employees working in offices under the generation directorate, regularly in national and international level. Similarly, it provides suggestions and assessments to the Deputy Managing Director regarding administrative tasks.

Preserving and record keeping of the Asset management, employee e-attendance, employee managements, record keeping, lands and physical structures management under Generation Directorate is also performed by this division. Finally, the administration division oversees the operation of vehicles for offices under this directorate, circulates notices as well as information to all the departments and branches of this directorate and assists in procurement works related to the directorate. There are currently 638 technical and 175 administrative staffs totaling 813 staffs working under this directorate (excluding under-construction projects) while approved positions are 793 for technical and 298 for administration with a total of 1091 positions. Similarly, there are 117 employees working under under-construction hydroelectric project while the approved positions are 139.



### Summary of Employee status under Generation Directorate

Particulars	Service	Approved Positions	Incumbent
Officer level	Technical	174	110
Asst. level		619	528
Technical total		793	638
Officer level	Administration	38	38
Asst. level		260	137
Administrative Total		298	175
Total (Technical + Administration)		1091	813

### Summary of Employee status of under construction Hydro Electric Project

Particulars	Approved Positions	Incumbent	Deficit
Upper Trisuli 3A Hydroelectric project	77	59	18
Kulekhani III Hydroelectric Project	40	39	1
Tinau Sundarjal rehabilitation Project	11	8	3
Chameliya Hydroelectric Project	11	11	0

Note:- Now, deficit of asst. staffs is fulfilled by service contract of level 1-3.

## FINANCE DIVISION

Finance Division under Generation Directorate, NEA is liable for preparation, implementation and control of financial matters for itself as well as for hydro-electric projects and hydro-power plants under the directorate. Finance division keeps account of financial transactions-income, expenditure, assets and liabilities. It plays role as a liaison office as it receives budget/fund from Corporate Finance Department and disseminate it to respective power houses and plant as per their requisition. Finance division consolidates book of account- expenditure, income, assets and liabilities monthly as well as annually and reports the same to the Account Department, NEA. It also prepares other financial reports and statements for internal use and also as per the direction of superior body. It solely operates as distinct budget center as well as a central body of many budget centers under the generation directorate.

## ANNUAL BUDGET & PROGRAM

Finance division, generation directorate is responsible for consolidation and preparation of annual budget and programs for the projects and plants under the directorate. The preparation begins with an assessment of the annual capital budget as well as operation and

maintenance budget and programs of significance at the central level. The power stations propose annual budget and program to cover capital investments and operation & maintenance expenditures. Generation directorate subsequently involves the power stations and customizes their needs to produce an annual financial plan. The financial plan guides to the optimum allocation of available funds to achieve the common goal of the directorate. Generation directorate works with the central payment, NEA for administration of funds to those set programs and their timely disbursements. The finance division also provides support during the preparation of technical specifications, procurement process, contract administration and management at the central office and issues directives to establish sound financial discipline to the offices under its supervision. The division is working towards cut-down of operation and maintenance expenses contributing to the overall objective of austerity measures NEA.

## AUDIT

Internal Audit and statutory audit is carried out timely and regularly on the basis of regularity, economy, efficiency, effectiveness and rationale to assure that all the transactions are carried out and recorded sufficiently and reliably. Audit helps to immediately correct any intentional







or unintentional errors, mismatch and wrong treatment as well as provide feedback for further corrections, improvements to the anomalies. Finance division replies to these issues raised by auditor on the related matter with consultation with concerned chief along with supporting documents.

## ASSET & INVENTORY MANAGEMENT

Goods required mainly for the administrative works, repair and maintenance works are purchased on the basis of immediate requirements by procurement unit. The maintenance of stock, its receipts, disbursement (expenses) is carried out by 'store-keeping unit' under the finance division. Stock management consists of customized accounting software by the store unit and further accounting is done with the help of CAIS accounting software. Fixed assets and its semiannual depreciation, calculated on straight line method, are maintained with the help of AMS (Asset Management System). Annually, physical verification is carried out to assure the safety, efficient use status and safekeeping of those assets.

## PROBLEMS AND WAY FORWARD

Finance division is facing pending settlement of transaction since 2046/047. Mainly there are inter unit accounts (inter branch transaction), LC advances, employee loan and advances yet to be settled since long period. Old unsettled transactions are difficult to settle due to lack of concerned documents. These old pending accounts are settled searching the related document if available. There are distinct offline accounting software for payroll management, accounting, store, asset management, attendance management. These distinct software need to be integrated to generate a complete report which will be carried out following initiation of finance directorate in coming years. Strict compliance of Nepal Accounting Standard, Financial laws, internal financial rules & regulations, policies, directives are main guidelines for book keeping, preparation and presentation of financial reports.

## MONITORING AND INFORMATION TECHNOLOGY SECTION

The monitoring and information technology section,

headed by a deputy manager (Technical, L-9), reports directly to the Deputy Managing Director and monitors all the departments, divisions, projects and power plants under the Generation Directorate.

This section has the mandate to prepare monitoring framework of technical works and prepare quadrimester/annual reports after monitoring the projects and power plants according to this framework. Also, this section has obligation to conduct budget planning discussions in assistance with finance and administration divisions. Operation of MIS software also falls under the jurisdiction of this section.

Furthermore, it organizes progress review discussions, budget compilation, and progress compilation for all the offices under generation directorate. It also identifies the necessity for training of technical personnel and reports the same to the DMD. Preparation of website for generation directorate and update it with all the activities under this directorate, thereby utilizing information and technology to its maximum. Similarly, it studies the yearly procurement plan of the departments, power plants and projects under the generation directorate and submits them for approval; keeps record of construction and goods procurement works' details of all the related plants and projects and updates the same in the website.

This section also performs activities like circulating all the instructions, received from the deputy managing director, related to monitoring works; update the generation details received from the generation operation and maintenance departments; prepare performance analysis indicator of all the related departments, plants and projects. Finally, it assists in all the technical works under the directorate and identifies any technical problems under the directorate and informs the same to the deputy managing director.

## AMI (Advance Metering Infrastructure) System

Advanced Metering Infrastructure/Automatic Meter Reading System (AMI/AMR) is a system of measuring, Collecting, Storing, Analyzing and using energy related data in real time. We have started the implementation of AMI system in NEA Hydropower stations and AMI system in 33 CT Operated Energy Meters in different Hydro power Stations with the coordination to Smart Metering

Present Data Report

From: 2076-04-29 To: 2076-04-29 Search By: All Search: All Submit

Copy Csv Excel Pdf Print Export All Show 20 rows

Search

Phasor	Meter Number	Modem Number	Consumer Number	Consumer ID	Consumer Name	Meter Date
Phasor	201701203367	NE02260118G3	No Consumer Number	0	DEVIGHAT	14/08/2019 3:30:26 PM
Phasor	201701203356	NE09331118G3	No Consumer Number	0	DEVIGHAT	14/08/2019 3:19:05 PM
Phasor	201701203354	NE09349118G3	No Consumer Number	0	DEVIGHAT	14/08/2019 3:02:03 PM
Phasor	203320354	NE06779118G3	No consumer Number	0	TRISULI	14/08/2019 2:06:54 PM
Phasor	201701203303	NE09337118G3	No Consumer Number	0	GANDAK	14/08/2019 2:59:56 PM
Phasor	201701203366	NE06907118G3	No Consumer Number	0	DEVIGHAT	14/08/2019 3:00:50 PM
Phasor	203345153	NE09343118G3	No Consumer Number	0	KULEKHANI-I	14/08/2019 2:21:42 PM
Phasor	203345154	NE09355118G3	No consumer Number	0	DEVIGHAT	14/08/2019 2:48:11 PM
Phasor	203345155	NE09344118G3	No consumer Number	0	KULEKHANI-I	14/08/2019 1:44:53 PM
Phasor	203345152	NE09324118G3	No consumer Number	0	KULEKHANI-I	14/08/2019 1:38:29 PM
Phasor	203321060	NE07502118G3	001	0	PEWA POWER 1	14/08/2019 2:06:27 PM

Cover-final.pdf Show all

Smart Grid Project under Distribution and consumer Service Directorate. Now all of those 33 meters current data can be accessed, monitored and analyzed through web in centralized server through NEA web address [www.ami.nea.org.np](http://www.ami.nea.org.np).

Following are the details of AMI system installed energy meters in Hydropower stations in Generation Directorate in FY 2075/76

1. Kulekhani I HPS – 5 Numbers
2. Kulekhani II HPS – 5 Numbers
3. Marsyangdi HPS – 3 Numbers
4. Trisuli HPS – 1 Numbers
5. Devighat HPS – 12 Numbers
6. Gandak HPS – 3 Numbers
7. Seti- Fewa HPS – 4 Numbers
8. Puwakhola HPS – 3 Numbers (Installation on process)
9. Sunkoshi HPS – 1 Number (Installation on process)

Remaining hydropower Stations have the energy meters those are either electromechanical meters or other old type meters which are not feasible to install currently available AMR/AMI system in NEA. Though we are on the process of replacing such meters as soon as possible in all the power houses and currently replaced meters will be integrated to the AMR/AMI system. In FY 2075/76 total 29 numbers of digital CT operated energy meters are replaced in respected HPS.

1. Chameliya HPS - 7 Number of Digital CT operated Energy Meters
2. Kaligandaki 'A' HPS - 7 Number of Digital CT operated Energy Meters
3. Trishuli HPS - 11 Number of Digital CT operated Energy Meters
4. Marsyangdi HPS - 4 Number of Digital CT operated Energy Meters
5. Kulekhani I HPS Replacing 12 no. of meters (On process)



## EPR (Enhanced Performance Reward) Software of Hydropower Stations

In this FY 2075/76 Generation directorate had done different workouts for updating the EPR software for the staffs working on Hydropower station on the basis of Operation & Maintenance Manual published by Nepal government (Electricity Development Department). Old EPR software was designed for Windows Xp, 32 bit

Operating system which is now absolute and Microsoft has stopped its update and support. So newly deployed software will be capable to run in windows 7/8/10 or higher versions with 64 bit operating system platform. Also some of the modern features with automatic graphical view of EPR will be updated and further it will run in centralized mode so that a EPR software for all the HPS can be operated through a single server in coming years.





# UPPER TRISHULI 3A HYDROELECTRIC PROJECT



Fig: Arial View of UT 3A Headworks

## PROJECT BACKGROUND:

Construction of Upper Trishuli-3A HEP, a run-of-river project of 60 MW was initiated in June 2011. The estimated cost of the project is 125.775 Million US\$ which is being funded by concessional loan from China Exim Bank. Contract for the major construction work (Civil, Electro-mechanical & Hydro-mechanical works) was signed with China Gezhouba Group Company Ltd., China (CGGC) at a cost of 89.177 Million US\$ excluding VAT while construction supervision of the project was awarded to Northwest Engineering Corporation Limited,

China (NWH), at a cost of 3.932 Million US\$ excluding VAT. Contract for the Transmission line work was awarded to China International Water & Electric Corporation (CWE) at a contract price of 22.6 million US\$ excluding VAT.

## MAIN PROJECT WORKS:

To date main Contractor CGGC has almost completed the main works including Headworks, Intake, Desander, Headrace Tunnel, Surge shaft, Vertical shaft, Tailrace Tunnel, Tailrace Pond, Power house Auxilliary Building, GIS building with accessories and facilities etc. From May



Fig : Generator Rotor

16, 2019, 72 hour generation test of Unit 1 (30 MW) has been started synchronizing with the national grid. After the successful test generation, Unit 1 is in continuous operation and supplying the electricity through the 44.7 km long 220 kV Double circuit Transmission line from Powerhouse to Matatirtha Substation charged with 132kV. Unit-II has also started its full load generation test on July 30, 2019 and will supply continuous generation after final inspections and debugging works to the national grid. The plant has already generated 16,185.60 MWh till Ashad 2076.

The substantial completion date of main plant project works will be August 30, 2019.

## TRANSMISSION LINE WORKS:

The total length of transmission line is 44.7 km (total 142 numbers of towers), which comprises of 1.3 km long (8 No of Towers) 132 kV double circuit from GIS to Trishuli-3B hub, 38.6 km long (120 No of Towers) 220 kV



Fig : 220 kV Transmission Line

Double circuit from Trishuli-3B hub to Badbhanjyang and 4.8 km long (14 No of towers) 220kV four circuit from Badbhanjyang to Matatirtha, Kathmandu. In addition, about 1.35 km length of 220 kV four circuit underground cable route leading to the Matatirtha Substation is also constructed.

Till date, all works of Transmission line have been substantially completed with testing and Taking over Certificate (TOC) has also been issued to the Contractor China International Water and Electric Corporation (CWE) on June 15, 2019. At present it is carrying the power generated from Upper Trishuli 3A Hydroelectric Project. In future this line is planned to carry the power from the Rasuwagadi, Sanjen and other power project from the Trishuli Basin.



Fig : Switchyard





## OTHERS:

Under Project Support Program (PSP) the construction of Eight school buildings, implementation of water supply systems, upgrading of road from Trishuli to Champani, road improvement to Trishuli hospital, Supply of hospital equipment, and construction of Irrigation drainage works, pedestrian trails, various village roads and water supply systems in project-affected areas of Four District (Rasuwa, Nuwakot, Dhading and Kathmandu) are also almost completed.

The project work which was being carried out at a rapid pace came to a stand still by the devastating earthquake of 25 April 2015. A number of huge landslides occurred along the 5 km access road from powerhouse to the headworks, which made the headworks virtually inaccessible. The landslide also blocked the access road to Surge Shaft and audit-1. Many construction equipment

of the Contractor including the temporary labor camps located near the Headworks, Audit-1 tunnel, Audit-2 tunnel and powerhouse, were heavily damaged.

After the earthquake, Nepal army was entrusted to open the track from powerhouse to headworks. Now, the Nepal Army has almost completed construction of retaining structure in access road, slope protection measures in right side hill and rock fencing and rock netting works at the left side hill slope of headworks for its stabilization.

The construction works has been resumed from October 2017 and the remaining works are being undertaken at a rapid pace and presently at the verge of completion.

This project with an annual energy generation of 490 GWh (gross) is targeted to be completed substantially by 2019 August.

### SALIENT FEATURES OF UPPER TRISHULI 3A HYDROELECTRIC PROJECT

1. Type of project	Run of River hydropower
2. Project location	
District/Zone	Rasuwa & Nuwakot of Bagmati zone
Headworks	1 km downstream of Mailung Trishuli confluence
Powerhouse	Near Simle village
Nearest Town	Trishuli about 19 km to the south
Nearest Roadhead	Simle near proposed powerhouse site
Length of access road	2.3 km new and upgrading of 11.3 km between Betrawati & headworks site
3. Hydrology	
Name of River	Trishuli
Reference Hydrology	Betrawati St. no. 447
Catchment area	4542 sq. km
Design Discharge	51 cumecs based on 70% exceedance flow
4. Geology	
Regional geology	Lesser Himalayas
Geology of project area	Good rock type, Gneiss, Schist
5. Project General Description	
Gross Head	144.5 m



Type of headworks	Gated weir with side intake
Design flood	2424 cumecs based on 1:1000 year flood
Full Supply level	El: 870.5 m
Undersluice gate size	4 nos. 11.6 m x 10 m
Intake type	Side intake
Intake channel length	148 m
Desander	Dufore Type
Desander size	95 m x 37.5 m x 15.84 m (L x B x H)
Headrace tunnel length	4,076 m
Headrace tunnel Shape	D type (excavated) and Horse-Shoe (finished)
Headrace tunnel Size	5.4 m for concrete lined and 6m for shotcrete
Shotcrete lined portion	60% of total length
Surge shaft	Restricted orifice type 11 m dia. 65.45 m high
Vertical shaft	Length 121 m, diameter 4.3 m
Pressure tunnel	Length 131.924m, diameter 3.3 m
Powerhouse Type	Underground Cavern
Powerhouse Size	56.6 m x 15.6 m x 36.5 m
Turbine Type	Vertical Francis
Installed Capacity	60 MW (2 X 30 MW)
Switchyard Size	72.5m x 51m
Tailrace Conduit	Horse Shoe type 5.6m x 4m size, 162.96 m length and twin conduits 31.44 m length
Tail water Level	El. 726 m
6. Power & Energy	
Minimum power Generation	43.75 MW
Annual average Energy	489.76 GWh (gross)

### Annual Design Energy

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
MW	49.67	43.75	43.97	55.55	59.60	59.60	59.60	59.60	59.60	59.60	59.60	59.60
GWh	36.96	29.66	32.71	40.00	44.34	42.91	44.34	44.34	42.91	44.34	42.91	44.34

7. Power Evacuation	
Length of Transmission Line	44.7 km
Transmission Voltage	220 kV initially charged at 132 kV
Interconnection point	Matatirtha substation at Kathmandu
8. Project Cost	
Total Project cost	125.78 Million US\$
Concessional Loan from The Exim	
Bank of China:	640 million RMB for Plant Project and Consulting services,





154 million for Transmission Line Project	
Total Loan Amount:	794 million RMB
Plant Project Contract Price	USD 100.771 million with VAT
Transmission Line Project Contract Price	USD 25.532 million with VAT
Consulting Services Contract Price	USD 11.434 million with VAT
9. Project Economics	
Benefit cost ratio	2.18
EIRR	21.6%
Specific energy cost	3.03 cents/KWh
10. Estimated Project	
Completion date	April 30, 2019



Fig : Power house area

# CHAMELIYA HYDROELECTRIC PROJECT

## Project Background

Chameliya Hydroelectric Project is under joint funding of GoN, NEA and EDCF K-Exim Bank, Korea. Civil works was started in January 2007 and Electromechanical, Hydrometrical and 132 kV Transmission Line was started in May 2009. The power house site is located at SailyaSikhar Municipality-1, Balanch, Darchula and the Dam site is located at Marma Rural Municipality, Bitule of Darchula District. The plant capacity is  $2 \times 15 = 30$  MW, 6-hour Peaking Run of River (PRoR) with average annual energy generation of 184.21 GWh. The project has been in operation after inauguration by then Honorable Prime Minister, Sher Bahadur Deuba on February 10, 2018 (Magh 27, 2074).

Currently, Chameliya Hydropower Station has been established under Large Generation, Operation and Maintenance Department, Generation Directorate for daily generation, operation and maintenance of Plant. The Plant is under the defect liability period (DLP), from August 15, 2018 to August 14, 2019, of the Contractors' M/s KHNP Consortium, Korea (EM/HM/TL works) and M/s CGGC, China (Civil Works). The cumulative generation of the plant until Asadh 2076 is 213.85 GWh.

At present, the Project has under taken major works of upgradation of Gokuleshwor, Balanch access road. It

has also initiated the modification of existing cooling water filtration system by installing by-pass system with pre-filter and auto backwash filters and the intake structure by installing a trash-rack cleaning machine (TRCM) is also being installed which were not included in the initial scope of works. The contract agreement for procurement of those equipments were already signed and manufacturing works are under progress

The EM/HM/TL Contractor, M/s KHNP Consortium are performing necessary maintenance works as per the Condition of Contract, to be done prior to completion of DLP, together with staff of Chameliya Hydropower Station, like repair of inflatable shaft seal, re-check and repair of protection system, re-check, repair of PLC and Governor. The Contractor have also supplied various parts for repair works.

In addition, the project has handed over 33kV Balanch-Gothalapani transmission line to Baitadi DCS and handover of 132 kV Balanch, Attariya transmission line to Attariya Grid Office is under process. The process of payment of compensation amount to land owner of right of way and correspondence with Department of Forestry for cutting the danger trees outside the ROW is under way. The preliminary stage of capitalization has also been completed by the Project.



# GENERATION DEVELOPMENT DEPARTMENT

## INTRODUCTION

Generation Development Department (GDD) has the main objective of performing regular monitoring, inspection and resource management of under-construction projects of Generation directorate. Presently, department is looking after the construction of Kulekhani III hydropower project (14 MW), which is a cascade project of the only storage power plant in Nepal. To accomplish this objective, GDD has a mandate to prepare policies and programs, to ensure the timely completion of under-construction projects, and submit it to the Generation directorate. Similarly, it provides necessary instructions to the projects after performing regular monitoring and inspection; submit timely reports of the project's budget and progress to the directorate; performs essential record maintenance of project's resources, lands and buildings; prepare quadrimester progress reports of the projects and submit it to the generation directorate.

## KULEKHANI III HYDROELECTRIC PROJECT

### PROJECT DESCRIPTION

Kulekhani is the only one reservoir Project in Nepal, which has been providing much needed peaking energy to the Integrated National Power System (INPS). The 14 MW Kulekhani III Hydroelectric Project with two numbers of Francis turbine is a cascade Project which utilizes the regulated flow of Kulekhani Reservoir and additional water from KhaniKhola. It has expected to generate about 40.85 GWh of electrical energy per annum.

The funds are provided by the Government of Nepal and Nepal Electricity Authority (NEA) for the construction

work. The total estimated cost of the Project was NRs. 4.63 billion. The Project is located on the southwest of Kathmandu in Makawanpur district, Province number 3 (previously Narayani zone of the Central Development Region).

The headworks site is located on the left bank of KhaniKhola at Bhainse, about 11 km north of Hetauda. The Powerhouse is located about 5 km north of Hetauda at Sanutar village adjacent to the Tribhuvan Highway. The Civil Works Contract has been awarded to M/S Sinohydro Corporation, China and the Electromechanical & Hydro-mechanical Works Contract has been awarded to M/S Zhejiang Jinlun Electromechanic Co. Ltd., China. The Consultant is M/S WAPCOS Ltd., India.

## PROJECT STATUS

The project was initiated in 2008 April with the contract award to the civil contractor while the contract for Electromechanical & Hydro-mechanical contract was awarded in 2010. Over the years, the project went through a lot of complexities of various nature which resulted in serious project delays. Nevertheless, every efforts are being made to resolve the issues, overcome the problems and complete the project as early as possible. By the end of fiscal year 2075/076 (July 2019) approximately 96 percent of the works in total has been completed. 100 percent of the Civil construction works has been completed and about 95 percent of the Electromechanical & Hydro-mechanical works has been completed. The remaining works are expected to be completed by September 2019.





## Electromechanical/Hydro-mechanical/Transmission Line Works:

**Hydro-mechanical work:** Installation of penstock has been completed. All major installation works of the gates, trash rack, stop-logs and its accessories including hoisting system at headpond area had been completed. Installation of small gates in desandar area is ongoing.

**Electromechanical work:** Installation of turbine-generator, inlet valve, governor, cooling water system, air compression system, control and relaying system of both units and 132 kV switchyard have been completed. Recently, preliminary testing of equipment and trial run of turbine-generators is going on. Final testing & commissioning is remaining.

**Transmission line:** Transmission line work is underway.

### Salient Features:

Location	Headworks near Tailrace of Kulekhani II Project at Bhaise Dobhan and Powerhouse at Sanutar village (4.5 km north of Hetauda city), Makwanpur district
Type	Cascade Project of Kulekhani Storage Project
Installed Capacity	14 MW
Annual Energy	40.85 GWh
Catchment Area	143 km <sup>2</sup>
Design Discharge	16.0 m <sup>3</sup> /s
Gross Head	109.8 m
Net Head	103.17 m
Headworks	
Khani Khola Intake	Conventional Side Intake on stilling basin downstream of the consolidation check dam
Conveyance length	302 m (Connection Pipe, Headpond)
Headpond	Capacity 2067m <sup>3</sup> ; Size 30m*10m; Siphon Barrel Size 2.7m×2.7m×68.8m
Headrace Tunnel	Horseshoe shaped concrete lined; Length 4221.636m; Diameter 3.5 m
Forebay	Underground; Horseshoe shaped concrete lined; Length 112.15m; width/height 6m/9m
Adit Tunnel	6 numbers; Inverted D shaped; 1197.995m (including branch of Adit 3), Diameter 3.5m except Adit 3 with diameter 4m
Connection Tunnel	Horse shoe shaped; Length 651.2m; Diameter 3.5m
Tunnel Penstock	Horse shoe shaped; Length 385.59 m; Diameter steel/tunnel 2.3m/3.8m
Powerhouse	Semi Underground; Dimension 13.10m×21.8m×31.1m
Tailrace	125.4m RCC closed duct and 57.89m open channel; Size 3m×3.5m for closed duct; 10m width of open channel
Turbine	2 Vertical Axis Francis Turbine
Generator	Two 3 phase, Synchronous AC
Transmission Line	132 kV; 0.5 km



# LARGE GENERATION OPERATION AND MAINTENANCE DEPARTMENT

The operation and maintenance of six (6) hydropower plants and one (1) Multi-fuel power plant (with capacity 30 MW and above) fall under the jurisdiction of this department. The total installed capacity of these plants is 444 MW. Total generation from the power plants under this department in the fiscal year 2075/76 is 2115.67 GWh, with an increment of 11.57 % as compared to that of last fiscal year's generation. The generation from, Kulekhani I and Kulekhani II (cascade of Kulekhani I) plants are mainly intended for meeting peak load demand as per system requirement.

Overhauling of generating units is a regular practice, normally carried out in the lean season avoiding energy loss. This ensures that design capacity is available during wet season. Apart from preventive and corrective maintenance works, periodic major overhauling was

carried out in Kaligandaki A, Middle Marsyangdi and Marsyangdi power plants. Kulekhani-I and Kulekhani-II being reservoir type power plants do not experience erosion problems and hence, only regular preventive maintenance activities were carried out.

In this FY, the Kulekhani I (Indrasarovar) reservoir got the maximum water level after 2071 B.S.(masl 1527.17), where as the KL-I & KL-II are in generation mode with full capacity (92 MW) from 2076-3-30 with maximum rainfall of water on 2076-3-29 & 30.

Similarly, In this F/Y 2075/76, Middle Marsyangdi Hydro Power Plant had generated electrical energy 471.33 GWh which was the maximum generation till date from commissioning



Fig : MMHPS Headworks

# KALIGANDAKI "A" HYDROPOWER STATION

## INTRODUCTION:

Kaligandaki 'A' Hydropower Station, located at Beltari, Syangja is the largest power station in Nepal with installed capacity of 144 MW with 3 units having capacity of 48 MW each. It is a six-hour peaking run-of-river type power station having annual design generation of 842 GWh and was commissioned in 2002.

The cumulative generation of the station till F/Y 2075/76 has reached 12,918.85 GWh from the first run. The plant generated 871.914 GWh of energy this year which is an increase of 0.79% compared to that of previous year and 5.65 % more than annual design and 3.55% more than target generation this year.

## PRESENT STATUS:

Unit no. 2 was overhauled in FY 2075/76. Other major works included MIV modification work of unit no.2, which was pending since commissioning period. Under Kali Gandaki 'A' Hydropower Plant Rehabilitation Project (KGAHPPRP) financed by World Bank, installation and commissioning of a new hydraulic trash rack cleaning machine was completed on December 2017. In this FY 2075/76 Seven GSM based CT operated Energy meters have been installed successfully.

## PLANT OPERATION:

The unit-wise operation record of the power station in this FY 2075/76 is as given below:

Unit	Total generation (MWh)	Total running hours (h)
1	291,975.00	6499:54:00
2	293,072.00	6875:04:00
3	286,867.00	6664:26:00
Total	871,914.00	20039:24:00



Fig: New hydraulic Trash Rack Cleaning Machine



## MAJOR REPAIR AND MAINTENANCE WORKS IN FY 2075/76

### MAIN INLET VALVE (MIV) MODIFICATION WORK:

Heavy silt content in water & design problem of MIV caused the leakage in servomotor and difficulties in smooth operation of Unit 2 turbine and its MIV. So in this FY, the MIV modification work, changing of new servomotor, repair and maintenance of bypass valve of Unit 2 were carried out under the supervision technical person from OEM company (TOSHIBA, JAPAN). The MIV modification work of Unit No. 2 was started on 23rd September 2018 (7th Ashoj 2075) and completed on 24th October 2018 (7th Kartik 2075).

The main works performed during in MIV modification work of Unit no 2 are:

- Dismantling of old MIV, by-pass valve & servomotor
- Fitting of bulk head in penstock in place of MIV during maintenance.
- Replacement of new hydraulic servomotor.
- Replacement of butterfly valve disc seal retainer.
- Replacement of butterfly valve disc seal.
- Replacement of butterfly valve disc seat ring.
- Replacement of sleeves in stem of butterfly valve.
- Repair maintenance and reassembly of by-pass valve of MIV
- Replacement of stem bush (grease lubricating bush system).
- Assembly of repaired & modified MIV, new seal, seat ring & servomotor.

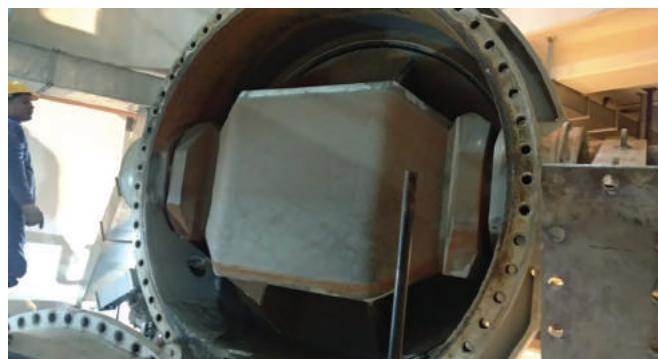


Fig: Disassembled MIV



Fig: Dry testing of assembled MIV



Fig: MIV after assembly



## ELECTRICAL MAINTENANCE:

- Plant control system & SCADA (supervisory control and data acquisition) up-gradation work is in progress, drawing approval work has been completed and components are being fabricated at Factory.
- OPGW communication system has been fully upgraded & reconfigured by installing new set of IP-PABX, thereby direct communication link between Power House, Beltari Office, and Dam-site & Mirmi Colony has been established.
- Installation of IP-CCTV Cameras at both Head-works & Power House areas for enhancing security system and monitoring Plant equipments & reservoir status



Fig: CCTV installation on various part of powerhouse.

- Installation of Radio Remote control system on overhead & Gantry cranes (4 nos.) has been completed in order to facilitate wireless operation of Electric Cranes.

### During overhauling of unit no. 2 following works was carried out:

- Cleaning, meggering and ratio test of excitation transformer Inspection of all the equipment of Generator Housing, measurement of air gap between rotor and stator, checking of PI values & electrical connection, replacement of the carbon brushes as required.
- Cleaning and ratio check of Neutral Cubical
- Maintenance and testing of synchronizing breaker
- Inspection and cleaning of speed signal Generator (SSG).

- Testing of 56.5 MVA power transformer
- Maintenance of GIS and protection cubicles.
- Dry and wet test

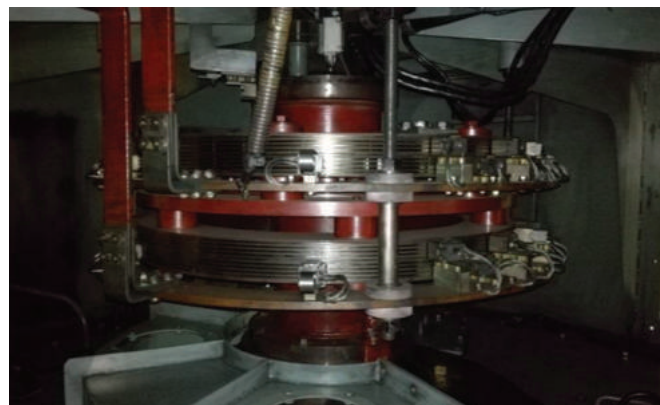


Fig: Maintenance of Slip Ring

## MECHANICAL MAINTENANCE:

### Under mechanical maintenance the following works has been carried out:

- Two set of runner and wicket gates (2 runner and 40 wicket gates) repairing and maintenance is about to complete and hard (HVOF) coating for both is in final stage.
- 50 nos. of upper stem bush and 40 nos. of lower stem bush of turbine wicket gates had been repaired and are in ready to use.
- Repair of 1 set of runner and wicket gate (1 runner and 20 wicket gates) are in process in which diametric portion is going to be HVOF coated and remaining profile is going to be soft coated.
- The manufacture & delivery of new Bottom ring had been completed & is ready to install. It will be installed in Unit 1 in presence of the manufacturer during Unit 1 overhauling.

### During overhauling of unit no. 2 following works were carried out.

- Dismantling of Turbine components (i.e. sensors probe, SSG, balancing pipes, shafts coupling bolts, shafts, head cover, Turbine bearing, wicket gates,





shaft seal, facing plates, runner, wearing rings etc.)

- Installation of the repaired HVOF coated runner.
- Assembling of the repaired & HVOF coated wicket gate and repaired upper stem bearings



Fig: Inspection of worn out runner.

- Installation of new fabricated balancing pipes.
- Installation of new spare turbine guide bearing
- Cleaning and repairing of generator air coolers of all the units
- Replacement of governor's actuator/solenoid valve set of Unit No. 2.
- Cleaning and refilling of Governor Oil Tank with new turbine oil VG 46.
- Flushing & cleaning of cooling water de-sander tanks and shaft seal water de-sander tanks.
- Cleaning of dewatering tanks & repairing of pumps.
- HVAC filters cleaning.
- Repairing of cooling water supply pumps & casing.



Fig: HVOF coated runner and wicket gates after assembly.

**Kaligandaki "A" hydropower station headwork area is a huge structure comprising of the following types of gates:**

- Three radial gates in diversion dam which are used to regulate the flood and flushing sediments during wet season and remains closed in dry season to store water
- Six radial gates in intake region which remains open in normal condition to allow water to pass towards de-sander basin and operated as per requirement during flushing of desander basin.
- One radial bascule gate used to remove floating debris from reservoir.
- Eight vertical sliding gates (under-slucice gates) in fore-bay pond which is used to flush the sediments deposited on fore-bay pond.
- One radial fore-bay gate that is used to flush the sediment on fore-bay pond.
- Twelve vertical sliding gates that regulate the flow in tunnel based on load requirements.
- Twelve radial de-sander flushing gates used for flushing of de-sander basin
- One fish way gate used to facilitate downward migration of fish and aquatic animals.



### Dam site mechanical works:

- Application of grease lubricants, filling of hydraulic oil and replacement of silica gel at all the three Diversion Dam Spillway gates.
- Damaged rubber seals have been replaced on diversion gates, De-sander flushing Radial gates.
- Repairing (welding and grinding) work of existing sill beam plates of diversion dam radial gate no 2 and 3 has been done.
- Corner joints (Rubber seal) of de-sander flushing radial gate no. 1, 2, 5, 7 and 12 have been replaced.

### Repair of Diversion Dam Spillway Gates:

- De-sander stop log slot has been repaired with welding, grinding and painting during the plant shut down for MIV maintenance period.
- Replacement work of the bronze seal strips (top, bottom and lateral sides), stainless steel guide plates (top, bottom and lateral sides) and Guide blocks (both side) of under sluice gates has been done.
- Steel liner repairing works by welding, grinding & coating / painting of under sluice gate structures were done during MIV maintenance period.

- Repair and maintenance work of travelling and hoisting system of Old Trash Rack Cleaner Machine has been done and ready to use it in operating condition for flood season.

### CIVIL MAINTENANCE:

Due to completely damaged stop-log seal beam placing of stop-log for downstream maintenance work of gates and spillway was not possible in diversion gate no. 1 and 2. So it was repaired by underwater repairing works during that period the vertical guide plates of stop-log slots had been repaired. In addition to that the following works has been carried out:

- Repair and maintenance of access road.
- Repair of de-sander basin.
- Tatopani to Aadhimuhan road improvement work.
- Vehicle shed and badminton court construction.
- Left bank toe protection work.
- Colony and office buildings repair work.
- Thulabagar river bank protection work.

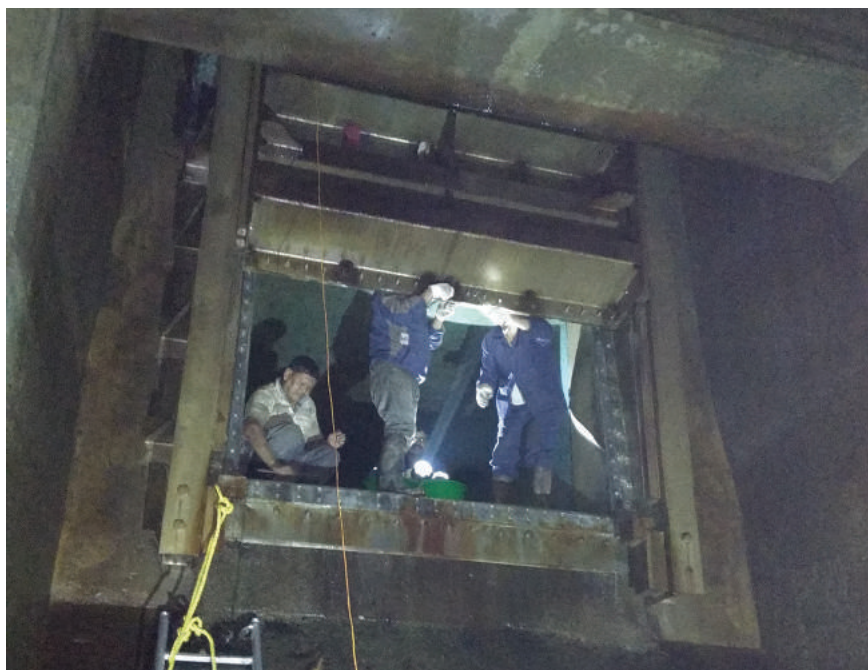


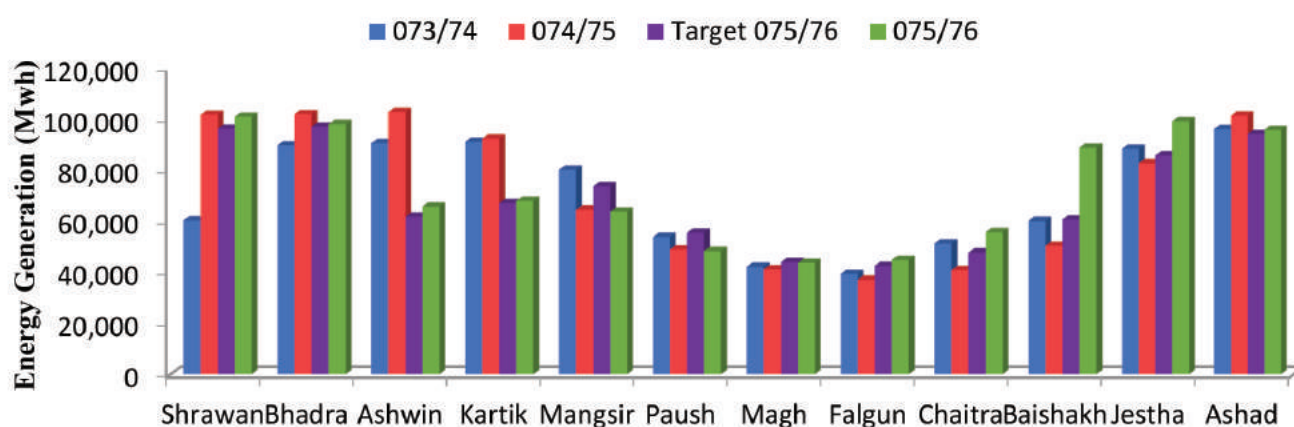
Fig: Replacement of bronze seal strip of Under-sluice gate



## SALIENT FEATURES OF KALIGANDAKI 'A' HYDROPOWER STATION

Type	Peaking Run of river (6 hours daily peaking)
Location	Kaligandaki Rural Municipality, Syangja
Installed capacity	144 MW
Average annual generation	842 GWh
Maximum gross head/net head	130m / 115m
Catchment area	7618 km <sup>2</sup> (Kaligandaki river) and 476 km <sup>2</sup> (Andhikhola river)
Live storage volume	3.1 million m <sup>3</sup>
Total length of waterways	183m power conduit, 5905m headrace tunnel
Penstock	1 Nos., 243m long, Ø 5.25m, inclined steel lined
<b>Turbine:</b>	
Number & Type	3 Francis
Output	48MW each
Rated flow	47 m <sup>3</sup> /s per unit
Rated speed	300rpm
<b>Generator:</b>	
Rated output	56.5MVA
Rated voltage	13.8kV
Rated frequency	50Hz
Rated power factor	0.85
Excitation	Static
Power transformer	56.5 MVA, 13.8/132 kV, 3 phase, 3 nos.
Transmission line	132kV, 104.6km (Single circuit of 65.5km to Pokhara sub-station and double circuit of 39.1 km to Butwal sub-station)

## MONTHLY ENERGY GENERATION





Unit: MWh

## Kaligandaki 'A' Hydropower Station

FY/Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
058/59	-	-	-	-	-	-	-	-	13,137.00	39,413.00	35,629.00	29,835.00	118,014.00
059/60	27,416.00	30,223.00	31,011.00	30,875.00	56,208.00	53,015.00	42,455.00	41,836.00	47,077.00	55,907.00	51,817.00	44,749.00	512,589.00
060/61	52,681.00	50,793.00	38,641.00	47,427.00	52,353.00	49,833.00	41,811.00	38,545.00	45,445.00	48,534.00	43,094.00	18,488.00	527,645.00
061/62	37,812.00	43,189.00	37,565.00	35,781.00	50,501.00	51,423.00	44,156.00	38,680.00	40,784.00	50,484.00	63,889.00	57,388.00	551,652.00
062/63	54,885.00	52,762.00	51,050.00	46,313.00	62,455.00	51,237.00	42,590.00	38,487.00	42,325.00	50,026.00	63,337.00	65,881.00	621,348.00
063/64	72,058.00	63,670.00	49,506.00	56,461.00	61,716.00	50,050.00	38,141.00	45,451.00	60,445.00	64,899.00	67,596.00	77,753.00	707,746.00
064/65	76,311.00	78,497.00	69,083.00	66,687.00	71,406.00	53,445.00	40,849.00	39,388.00	39,539.00	59,890.00	78,783.00	85,124.00	759,002.00
065/66	89,321.00	86,044.00	82,606.00	83,169.00	70,734.00	46,916.00	40,746.00	34,545.00	37,985.00	49,995.00	59,477.00	71,830.00	753,368.00
066/67	80,051.00	79,966.00	80,250.00	73,734.00	74,531.00	51,286.00	39,437.00	36,700.00	44,896.00	52,461.00	75,593.00	71,336.00	760,241.00
067/68	53,269.00	87,880.00	82,943.00	76,109.00	72,479.00	52,327.00	40,719.00	38,588.00	38,994.00	52,656.00	85,843.00	93,365.00	775,172.00
068/69	97,146.00	95,179.00	89,537.00	86,031.00	76,345.00	53,209.00	41,116.00	38,628.00	46,979.00	52,635.00	93,203.00	90,746.00	860,754.00
069/70	96,909.00	97,864.00	90,407.00	82,537.00	64,932.00	46,001.00	42,012.00	33,049.00	44,102.00	63,648.00	91,419.00	94,378.00	847,258.00
070/71	98,236.00	95,962.00	91,030.00	86,067.00	76,451.00	54,688.00	43,803.00	39,834.00	42,398.00	53,606.00	84,210.00	97,818.00	864,103.00
071/72	92,893.00	94,718.00	93,846.00	89,647.00	79,804.00	63,775.00	47,628.00	49,830.00	54,446.00	72,514.00	96,732.00	94,150.00	929,983.00
072/73	96,658.00	93,079.00	93,238.00	87,804.00	62,790.00	45,187.00	39,552.00	36,393.00	42,762.00	50,026.00	59,201.00	44,152.00	750,842.00
073/74	60,206.00	89,668.00	90,518.00	91,053.00	80,170.00	53,708.00	42,031.00	39,253.00	51,118.00	60,017.00	88,297.00	96,110.00	842,149.00
074/75	101,725.00	101,928.00	102,818.00	92,307.00	64,444.00	48,791.00	41,121.00	36,950.00	40,748.00	50,251.00	82,633.00	101,359.00	865,075.00
075/76	100,902.00	98,017.00	65,650.00	67,913.00	63,726.00	48,224.00	43,580.00	44,728.00	55,593.00	88,709.00	99,146.00	95,726.00	871,914.00
Total generation till Date, MWh													12,918,855.00



# MIDDLE MARSYANGDI HYDROPOWER STATION

## INTRODUCTION

Middle Marsyangdi Hydropower Station (MMHPS) has been generating electricity by diverting the water of Marsyangdi River originated from the Tilicho Lake in Manang district. Located in the Lamjung district of Gandaki Province, MMHPS has an installed capacity of 70 MW and a designed annual generation of 398 GWh.

MMHPS is a peaking run off river (PRoR) plant with daily peaking capacity of 5 hrs at minimum discharge. The plant was commissioned in December, 2008 and commercial generation started one month later.

The cumulative generation of the station has reached 4,479.9 GWh until the end of FY 2075/076. In this fiscal year the plant has generated maximum energy (annual) till date from commissioning i.e. 471.32 GWh which is an increase of 18.55% higher than that of design generation.

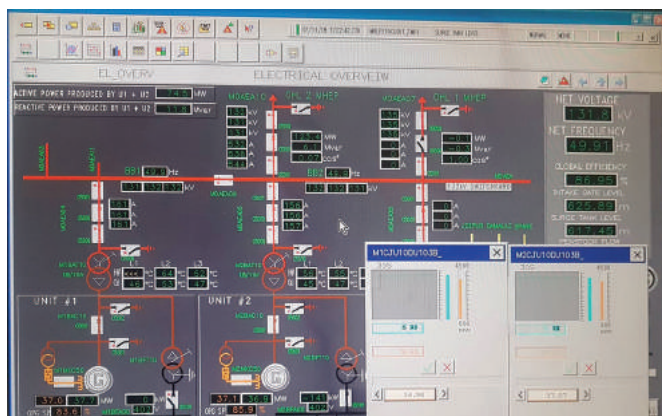


Fig: MMHPS SCADA Schematic Layout.

## PLANT OPERATION:

The unit-wise operation record of the power station in this FY 2075/76 is as given below:

Unit	Energy generated (MWh)	Running hour (h)
1	2,25,328.13	7,000.15
2	2,45,994.38	7,674.85
Total	4,71,322.51	14,675.01

## REPAIR AND MAINTENANCE ACTIVITIES IN FY 2075/076:

### ELECTRICAL MAINTENANCE:

- Megger test and BDV testing done in unit no. 1 power transformers during overhauling of unit1.
- Megger test and inspection of Generator unit no.1.
- Problem in the Distributed Control System, S-8000 network, PLC and SCADA was solved.
- Restoration of S-8000 optical ring network.
- Testing of existing Vacuum Circuit Breakers and newly procured vacuum circuit breaker at MMHPS.
- Changing of carbon brushes as per requirement basis in both the units.



Fig: Unit1 power transformers Meggering test carried out during overhauling of unit1

- Oil filtration and top-up process was carried out on the unit1 power transformers.



Fig: Transformer oil filtration

- Regular operation and maintenance work, preventive maintenance, and breakdown maintenance at Power House and Dam Site, SF<sub>6</sub> gas filling, servicing of 350 kVA powerhouse DG, Servicing of 250 kVA Dam site DG, fault identification and changing of contactor of DOL of cooling water control system of both units, maintenance of 33kV, 11kV, 400V, and street light line etc.

## MECHANICAL MAINTENANCE:

- Overhauling of Unit 1 Turbine.



Fig : Dismantling work during overhauling of unit no.1

- Replacement of the soft coated repaired Runner
- Assembly of the repaired and soft coated wicket gates
- Repair & Replacements of upper & lower bushes.
- Repairing of head cover.
- Repairing & assembly of balancing pipe and other accessories.
- Sill beam repair and rubber seal replacement in all 3 Spillway Radial Gates at Dam Site.



Fig: Repair and maintenance of sill beam of spillway radial gate





- Welding of sliding & fixed plates and repair of rubber seals & sill beams of Flushing Gates of De-sander at Dam Site.
- Replacement of Heat Exchanger plates of cooling water system of both units.
- Replacement of various valves of cooling water system of both units.
- Replacement of regulating valve of Trash Rack Cleaning Machine.
- Repair and maintenance of all vehicles of MMHPS.
- Sediment Flushing of reservoir has been done to increase the volume of live storage and to reduce the concentration of sediment around intake area.
- Drain clearance and maintenance at the slope of left bank at dam site and alongside the road from Fedikuna to Siudibar has been done.
- Self-level epoxy flooring work on floor no. 0, -1 and -2 of Powerhouse was completed.
- Repair and Maintenance of Quarter building, sewage, road to Surge tank and Valve chamber were carried out.
- Switchyard pebbling work.

## CIVIL MAINTENANCE:

- MS Plate lining work and Epoxy application work were carried out on the chutes of spillway no. 1 and 2



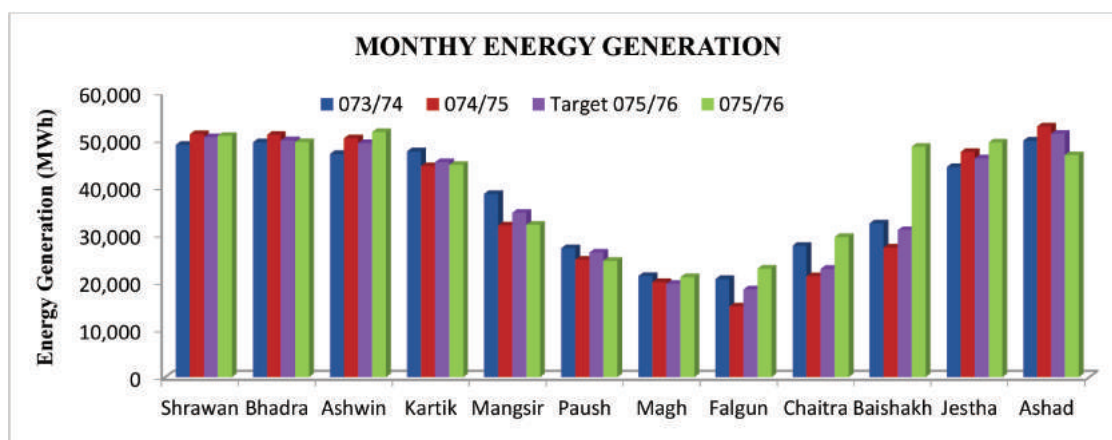
Fig 6. Application of soft coating on wicket gate



Fig: Gabion wall.

**SALIENT FEATURES:****General**

Type of project	Peaking Run off river with daily pondage for 5 hours peaking
Maximum gross head/net head	110m/98m
Total length of water ways	5940m
Power and Energy	
Installed capacity	70 MW
Annual average energy(designed)	398 GWh
Hydrology	
Catchment Area	2,729 km <sup>2</sup>
Reservoir	
Minimum/Maximum operating level	621.0 masl/626.0 masl
Live storage volume	1.65 million m <sup>3</sup>
Dam	
Type of dam	Combined concrete gravity and rock fill dam
Height	45m
Penstock	
Number, Type	1, concrete castes steel pipe(cut and cover)
Diameter penstock/bifurcation-manifold	Ø4.6m/ Ø3.0m to Ø240m
Switchyard at MMHPS	
Type	Open- air switchyard at el. 540.0 masl
Dimension(L×W)	43m×50m
Turbines	
Number and Type	2 Francis, vertical shaft
Rated Discharge	42.4 m <sup>3</sup> /s
Rated speed	333.33 rpm
Generators	
Number and type	Two, 3-phase synchronous
Rated output	39 MVA
Power factor	0.85-0.90
Transmission line	
Route	CKT1 MMHPS to Damauli CKT2 MMHPS to Markichwok S/S
Nominal voltage/ length	132 kV, CKT1=42.69 km 132 kV, CKT2=31.5 km







Monthly Energy Generation Status:													Unit: MWh	
Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baisakh	Jyestha	Ashadh	Total (MWH)	
Fiscal Year														
Designed	47840	47110	46980	42225	30805	21410	15990	14610	17565	26305	39615	47135	397590.00	
2065/066							13,567.40	25,998.60	22,049.70	30,667.10	36,794.70	39,922.30	168999.80	
2066/067	37,991.85	40,565.50	34,276.82	37,728.29	36,810.44	27,101.30	21,344.30	19,092.30	23,992.00	32,187.90	40,017.00	38,929.70	390037.40	
2067/068	38,821.40	34,967.10	38,460.50	37,942.20	20,057.90	27,531.70	21,542.80	19,874.80	20,831.30	28,733.20	44,877.40	43,511.00	377151.30	
2068/069	43,085.60	46,377.90	42,804.70	43,003.00	36,903.32	27,596.25	12,596.83	22,233.67	26,137.00	31,159.25	48,525.43	44,921.25	425344.20	
2069/070	46,076.26	45,292.50	45,674.04	41,152.02	33,758.00	24,383.87	21,573.81	21,063.29	22,739.02	33,288.75	46,612.51	46,468.12	428082.19	
2070/071	47,432.32	43,090.80	43,482.69	42,131.62	37,743.81	28,704.88	22,579.19	20,779.62	22,120.37	30,091.88	47,267.25	48,747.28	434171.71	
2071/072	47,282.72	48,324.38	47,179.75	47,231.25	37,403.50	30,473.37	11,838.75	23,625.88	26,554.75	37,981.05	49,097.69	50,325.00	457318.09	
2072/073	51,717.13	49,830.13	49,695.87	44,632.50	32,917.50	25,080.00	20,686.88	19,243.12	21,357.12	27,091.00	43,549.63	49,757.88	435558.76	
2073/074	48,932.74	49,469.13	47,004.38	47,550.87	38,579.13	27,121.87	21,285.00	20,666.25	27,627.25	32,370.88	44,234.75	49,809.37	454651.62	
2074/075	51182.13	51020.62	50314.75	44467.37	31968.76	24708.74	20006.26	14860.37	21243.75	27266.25	47447.87	52800.00	437286.87	
2075/076	50830.13	49500.13	51614	44704.7	32082.2	24471.6	21058	22842.3	29473.1	48551.1	49417.5	46777.75	471322.51	
Till Date Generation, MWh													4,479,924.45	

# MARSYANGDI HYDROPOWER STATION

## INTRODUCTION

Marsyangdi Hydropower Station is a peaking run-of river Power Station with installed Capacity of 69 MW, three units of 23 MW each and its annual design generation is 462.5 GWh. It is located at Aanbu Khaireni, Tanahu in the central region about 114KM west of Kathmandu on the Prithivi Highway and lies on the right bank of Marsyangdi River. It was commissioned in 1989 AD and developed with the assistance from IDA, KFW, KFED, SFD, ADB and GoN at a cost of USD 22 million.

The cumulative generation of Marsyangdi HPS has reached 12,407,451.90 MWh. It generated 475,176.00 MWh of energy in FY 2075/2076, registering an increase of 6.18% over the previous year's generation.

## PLANT OPERATION:

The unit-wise operation record of the power station in this FY 2075/76 is as given below:

Unit	Energy generation (MWh)	Running hours (h)
1	165,798.00	7081.25
2	140,271.50	5638.74
3	169,106.50	7304.70
Total	475,176.00	20024.69

## PRESENT STATUS

The plant is operating at optimum capacity in the wet season (except when not required for LDC) and during peak hours in the dry season. Each unit of the turbine has been overhauled once every three years on a regular basis. The average plant load factor during the last three fiscal years has been around 70-75%. This year,

unit 2 has faced the problem of cease of lower guide bearing, guide bearing labyrinth ring & oil pan due to shaft misalignment problem from long time ago which was rectified and maintained using proprietary goods and services from Voith India limited.

In this FY 2075/76 AMR/AMI system has been installed in 3 CT operated Energy meters for automatic remote meter reading purpose.

## REPAIR AND MAINTENANCE ACTIVITIES DURING FY 2075/76

### CIVIL MAINTENANCE:

- Maintenance of 2 nos. of C type and 2 nos. of D-type old staff Building.
- Repairing of Surge Tank access road & black topping & making of roads in Dhakaltar.
- Application of epoxy on OGEE surface Radial Gate No. 5, 2 & 1.

### MECHANICAL MAINTENANCE:

- Overhauling works of Unit No.2.
- Leveling generator bracket by inserting seam, alignment of rotor shaft, installation of new turbine guide bearing oil pan cover & its Labyrinth ring (supplied by Voith India Limited) installation & shaft alignment correction of Unit No. 2 in presence of technical expert from Voith India Limited.
- Replacement of shaft seal of Unit No. 2 & Unit No. 3
- Removal of sand and mud from the Drainage Gallery by newly installed Jet system.

- Replacement of new Turbine Guide bearing coolers & generator coolers in different Units.
- Powerhouse Gantry Crane coupling & high speed maintenance.
- Replacement of GIS Air Compressor.

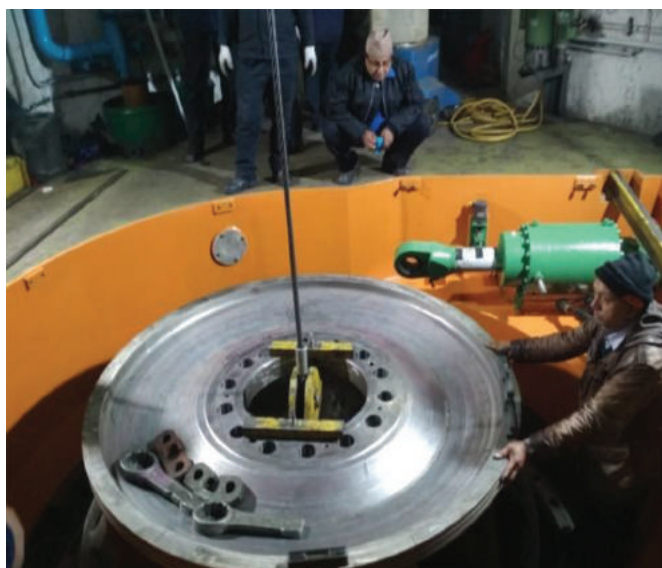


Fig: Lowering Runner during overhauling of unit no. 2



Fig: Level checking of Generator Rotor of unit 2.

## ELECTRICAL MAINTENANCE:



Fig: Cleaning and Maintenance of GIS "on block" valve (pneumatic type)

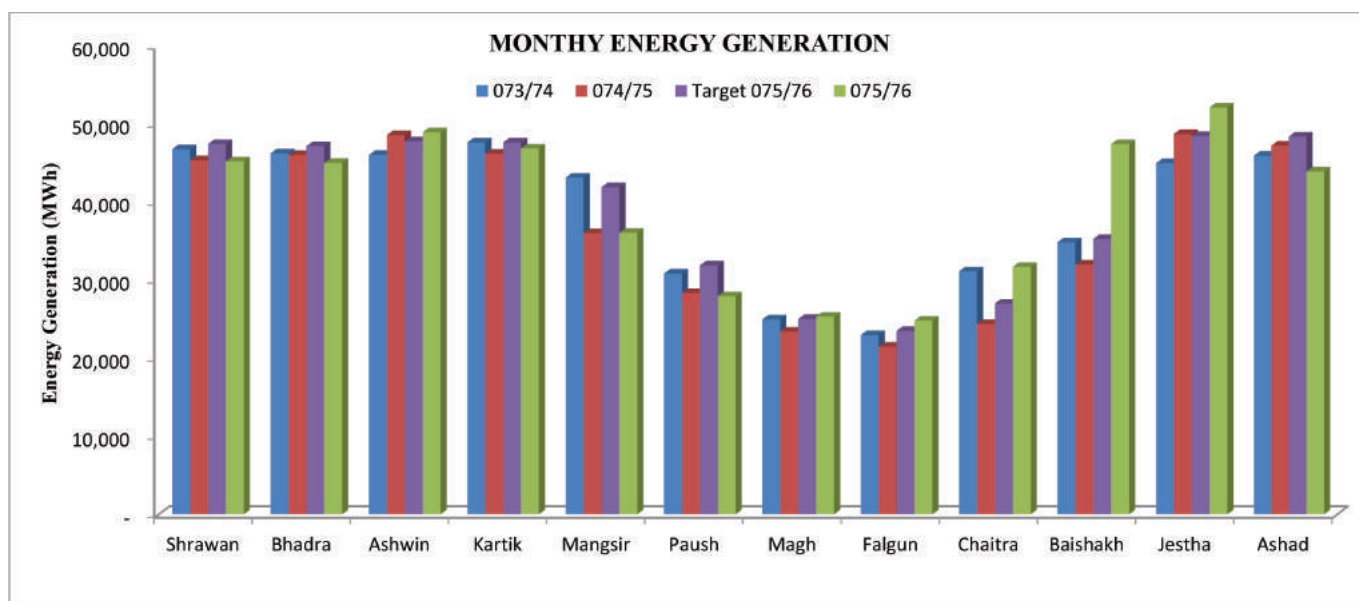
- Installation and commissioning of 110V/315 A main cell with 24V/100A end cell battery charger rectifier unit.
- Electrical Overhauling of Unit No. 2 including Generator & Transformer.
- Installation of additional new CCTV for different areas in Power House.
- Restoration of Electrical control system of Emergency gate operation.
- AMR/AMI system has been installed in 3 energy meters.

## ONGOING ACTIVITIES:

- Up gradation of existing single channel digital governor control system into double channel redundant type digital governor control system.
- Installation and commissioning of one main plus one standby redundant type 24V/100A battery charger rectifier unit.
- Procurement of filing valve (Bypass valve) for MIV & Sliding ring for shaft seal of runner from Original Equipment Manufacturer (OEM), Voith India Private Limited.
- Procurement of GIS "on block" valve (pneumatic type).

**SALIENT FEATURES OF MARSYAGNDI HPS**

Type	Peaking-run-of-river
Location	AanbuKhaireni Rural Municipality, Tanahun
Installed capacity	69 MW
Design annual generation	462.5 GWh
Catchment area	3850 Sq. km
Average annual discharge	210m <sup>3</sup> /s
Live storage volume	1.5 million m <sup>3</sup>
Rated net head	90.5m
Weir	102m long, Concrete
Head race tunnel	7199m, Ø 6.4m, concrete lined
Penstock	75m long, Ø 5m, steel lined
Turbine	3, Vertical Francis 30.5m <sup>3</sup> /s 26 MW 300 rpm
Number and Type	
Rated discharge	
Rated output	
Rated speed	
Generator	30 MVA 11 kV 50 Hz 0.85 Thyristor Self Excitation
Capacity	
Rated voltage	
Rated Frequency	
Power factor	
Excitation	
Power transformer	10 MVA, 11/132 kV, 9 (+1 Spare) Single phase
Transmission line	132kV, Total 108 km (Balaju 83km + Bharatpur 25km)





## Marsyangdi Hydropower Station

Unit: MWh

FY/ Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
046/47			444.70	11,896.80	22,510.50	28,116.90	25,507.50	24,130.50	25,666.90	34,226.60	29,583.30	30,349.90	232,433.60
047/48	33,375.70	23,836.90	20,794.50	20,642.20	34,756.10	29,639.50	23,932.40	22,322.40	25,147.90	32,177.00	41,010.70	41,246.80	348,882.10
048/49	42,177.40	42,583.80	42,056.40	39,535.50	35,882.60	29,617.60	24,502.40	23,092.60	23,529.90	27,935.70	39,833.40	42,615.50	413,362.80
049/50	38,733.10	39,966.10	36,649.70	38,437.70	37,042.20	28,547.20	23,796.10	22,425.90	21,045.20	34,875.70	41,785.90	38,716.10	402,020.90
050/51	34,855.00	37,374.90	43,013.90	42,888.70	41,574.80	28,664.30	25,274.70	22,114.60	28,609.00	29,135.70	45,457.50	44,546.50	423,509.60
051/52	42,553.90	42,356.90	47,124.00	47,767.60	35,703.90	28,376.00	23,108.00	22,647.20	27,335.70	40,949.70	47,651.30	44,234.30	449,808.50
052/53	46,231.70	46,607.30	49,076.70	47,068.70	43,083.60	33,579.60	28,052.10	27,757.60	30,042.70	39,525.90	47,603.60	45,298.70	483,928.20
053/54	48,743.50	47,271.10	46,848.20	45,794.00	44,132.00	32,711.70	26,893.20	24,401.00	26,803.70	35,100.40	44,465.30	42,111.10	465,275.20
054/55	44,569.10	39,568.60	11,889.90	47,279.40	40,728.70	34,435.80	28,250.90	25,853.30	31,546.80	44,755.90	52,012.20	49,068.70	449,959.30
055/56	46,104.70	46,214.60	49,488.60	50,929.70	41,708.80	32,712.70	25,394.30	22,896.10	23,925.90	39,232.60	45,308.80	48,008.70	471,925.50
056/57	45,906.70	46,655.10	44,736.60	48,756.20	42,962.10	32,644.70	25,838.10	23,430.40	26,830.80	35,728.50	47,235.80	36,943.00	457,668.00
057/58	45,847.60	44,408.50	39,654.70	44,548.70	40,844.40	30,556.80	24,655.70	22,956.10	21,290.10	30,835.20	41,439.20	43,949.30	430,986.30
058/59	43,499.00	34,592.90	37,313.40	35,842.70	37,262.10	29,183.40	26,187.90	22,505.20	27,786.60	31,768.70	29,918.00	30,273.30	386,133.20
059/60	26,983.30	24,753.20	23,938.10	27,047.60	34,847.60	31,181.90	25,028.30	24,589.30	27,192.90	30,028.60	28,443.10	29,887.10	333,921.00
060/61	15,470.90	22,506.40	12,237.00	19,045.50	18,980.70	22,216.20	21,190.30	18,843.90	13,842.30	27,826.00	27,567.60	24,925.00	244,651.80
061/62	28,925.90	32,193.60	26,408.40	23,161.80	32,249.10	29,490.40	25,621.20	22,803.80	23,326.20	25,836.60	30,886.10	34,814.70	335,717.80
062/63	36,259.00	34,169.40	29,468.90	26,496.90	35,501.20	28,848.60	24,506.80	22,229.70	23,994.80	30,074.50	39,820.50	38,046.00	369,416.30
063/64	37,623.90	40,458.60	36,556.30	33,373.20	33,066.90	27,813.80	22,784.20	21,473.40	27,534.80	34,846.00	41,072.50	44,964.70	401,568.30
064/65	40,121.30	40,088.50	35,308.60	32,214.10	38,180.50	31,449.40	23,738.50	23,429.80	23,424.40	36,860.30	44,995.00	42,989.40	412,799.80
065/66	42,275.90	34,515.50	34,108.30	43,177.80	39,697.20	28,720.90	23,340.40	20,425.50	24,087.40	33,865.60	39,735.90	40,854.80	404,805.20
066/67	38,039.70	39,339.30	38,800.80	37,211.20	39,229.80	28,733.10	23,229.60	21,430.00	24,728.30	34,223.20	41,188.90	38,851.00	405,004.90
067/68	38,272.10	42,258.30	41,360.20	40,607.20	39,868.40	30,600.30	23,859.00	22,755.80	21,900.40	29,757.00	46,449.00	45,473.60	423,161.30
068/69	45,669.20	45,602.40	37,491.70	44,563.40	34,698.00	31,715.70	25,909.20	24,523.90	27,934.20	32,558.20	48,613.00	46,620.50	445,899.40
069/70	48,103.80	45,592.60	45,991.70	45,590.00	38,143.30	27,769.20	24,507.00	23,452.80	23,855.40	34,303.70	46,635.10	46,191.40	450,136.00
070/71	47,931.30	47,357.80	47,394.30	44,153.30	42,266.00	32,649.90	25,847.80	23,338.40	24,027.60	30,313.80	46,217.80	50,190.10	461,688.10
071/72	45,934.40	46,659.20	36,827.60	49,103.80	41,677.80	35,540.50	26,605.70	26,809.30	29,409.00	36,966.20	49,584.90	47,863.10	472,981.50
072/73	48,826.40	46,974.50	47,612.60	45,954.70	36,995.30	28,660.50	23,532.30	21,779.10	22,841.60	27,416.60	45,033.40	46,109.60	441,736.60
073/74	46,750.40	46,225.10	46,015.90	47,630.50	43,117.30	30,838.70	24,960.00	22,961.80	31,122.10	34,827.00	44,950.10	45,906.60	465,305.50
074/75	45329.2	45978.3	48568	46168.5	35988.5	28317.7	23420.8	21454.8	24396.6	31968.8	48696.9	47202.2	447490.30
075/76	45197.2	44981.2	48,936.50	46863.2	36038.3	27926.5	25314.0	24811.5	31695.8	47422.2	52096.7	43892.9	475176.00
Till date generation, MWh	12,407,451.90												

# KULEKHANI-I HYDROPOWER STATION

## INTRODUCTION

Kulekhani I, located at Dhorsing, Makwanpur is the only reservoir type Hydro-electric Power Station in Nepal. It is situated in Lower Mahabharat Range of Makwanpur District, Central region of Nepal at about 30 km to the Southwest of Kathmandu, whereas the Kulekhani Dam itself is located at about 21 km Southwest of Kathmandu. It covers two basins of different river systems i.e. the Kulekhani river basin and the upper Rapti river basin neighboring to south of the Kulekhani river basin. It's Installed Capacity is 60 MW with two units of 30 MW each. This station was designed as a peaking power station but it is often operated to the system requirements for voltage improvement & system stability. The Power Station is designed to generate 165 GWh as primary energy and 46 GWh as Secondary energy.

The construction started in 1977 with financial assistance of the World Bank, Kuwait Fund, OPEC Fund and the Overseas Economic Co-operation Fund (OECF) of Japan. First Unit was commissioned in 14th May 1982 and the power station was inaugurated on 8th December 1982 (B.S. 2039-Marga-23). The total cost of the project was US\$ 117.843 Million and accordingly the project was transferred to NEA with a capital cost of approximately NRs. 1,550 million. The tele-metering system installed for the measurement of rainfall, water level etc. cost around NRs. 137.4 million. The cost of road check dams and inclined tunnel is about 23 crores.

In 1994, an overhauling work of the power station was performed with the grant assistance of Japan.

The cumulative generation of Kulekhani-I HPS till fiscal year 075/76 has reached 4853.024 GWh. The plant generated 91.184 GWh of energy in FY 2075/76. The maximum and minimum water level of Kulekhani reservoir in FY 2075/76 was recorded as 1527.17 masl (2076/03/31) and 1505.43 masl (2076/03/21).

## PLANT OPERATION:

The unit-wise operation record of the power station in this FY 2075/76 is as given below:

Unit	Total generation (MWh)	Total running hours (h)
1	53,042.00	2308.18
2	38,142.00	1770.10
Total	91,184.00	4078.28

## PRESENT STATUS:

Currently both units are running in normal operation. Overhauling work has not been performed since FY 2066/067 because no remarkable damages on turbines are found due to stored clean water in Indrasarobar. However preventive, corrective and scheduled repair and maintenance works are performed on regular basis.

In this FY 2075/76 AMR/AMI system has been installed in 5 CT operated Energy meters for automatic remote meter reading purpose.

## REPAIR AND MAINTENANCE ACTIVITIES DURING FY 2075/076

### CIVIL MAINTENANCE:

- Concreting Pavement works at Damsite Kalanki road.
- Repair and Maintenance of Checkwall at reservoir area for stopping debris entering into reservoir.
- Repair and maintenance of Staff Quarters at Colony.
- Replacement of Gravels at Switchyard.
- Repair and maintenance of access road at Control house.
- Painting of Control house.
- Procurement of Motorized and Non-motorized boat for reservoir inspection and survey works.
- Construction of water tank to supply clean water at colony area.



Fig:-Repair work going on at CHAKHEL Dam site

### ELECTRICAL MAINTENANCE:

- Installation of 11kV Vacuum Circuit Breakers for incomer and outgoing feeders at dam site for local distribution.
- Installation of 5 MVA, 66/11 kV power transformer at switchyard for local dedicated distribution to the DHORSING colony after the repair and maintenance from the central workshop.

- Corrosion resistant coating on 66kV live line Switchyard Gantry structures.
- Installation of New 66kV SF6 Circuit Breaker for machine synchronization.
- Installation of solar lighting system at MARKHU Colony area.
- AMR/AMI system has been installed in 5 energy meters in order to access remotely.



Fig:-Corrosion Resistant Coating on 66 kV Live Line Switch Yard Gantry Structure

### MECHANICAL MAINTENANCE:

- Painting of penstock pipeline from BL No 3 to BL No 7 area
- Repair and maintenance of Radial Spillway Gate with replacement of bottom seal.
- Installation of monorail hoist cranes for Store and Cooling water pump area of the powerhouse.
- Regular and Periodic Maintenance of Cooling Water Pump, Compressor and Vehicles.





Fig:-Repair of Spillway Gate with seal replacement



Fig:-Repair works of switchyard



Fig:- Kulekhani Reservoir (INDRASAROBAR)





## SALIENT FEATURES OF KULEKHANI-I HYDROPOWER STATION

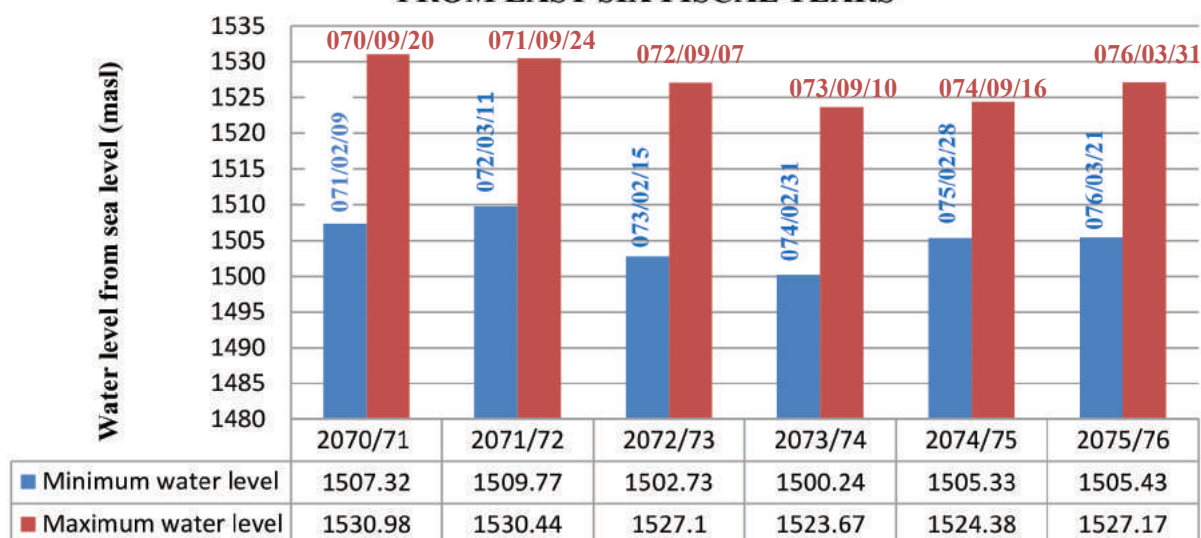
Type	Seasonal Storage
Location	Dhorsing, Makawanpur
Installed Capacity	60 MW
Rated Head	550m
Catchments Area	126km <sup>2</sup>
Design Discharge	12.1 m <sup>3</sup> /sec
Turbine: No. and Type	Two, Vertical Shaft Pelton
Rated Output	31 MW
Rated Speed	600rpm
Generator: Rated Capacity	35 MVA
Generating Voltage	11kV
Frequency	50 Hz
Dam	Zoned Rock Fill Dam with Inclined Core, 114m high, 406m crest length
Headrace Tunnel	Circular Section, Ø 2.5m x 6,233m in length
Penstock	Ø 2.0-1.5m, 1324m length
Main Transformer	Two, 35 MVA, 11/66 kV

Kulekhani (Indrasarovar) reservoir water level (minimum and maximum) from last six fiscal years:

Fiscal Year	Min Level with Date (masl)	Max Level with Date (masl)
2070/71	1507.32 (2071/2/9)	1530.98 (2070/9/20)
2071/72	1509.77 (2072/3/11)	1530.44 (2071/9/24)
2072/73	1502.73 (2073/2/15)	1527.10 (2072/9/7)
2073/74	1500.24 (2074/2/31)	1523.67 (2073/9/10)
2074/75	1505.33 (2075/2/28)	1524.38 (2074/9/16)
2075/76	1505.43 (2076/3/21)	1527.17 (2076/3/31)

## Kulekhani (Indrasarovar) reservoir water level from last six fiscal years

**KULEKHANI (INDRASAROVAR) RESERVOIR WATER LEVEL FROM LAST SIX FISCAL YEARS**





### MONTHLY ENERGY GENERATION

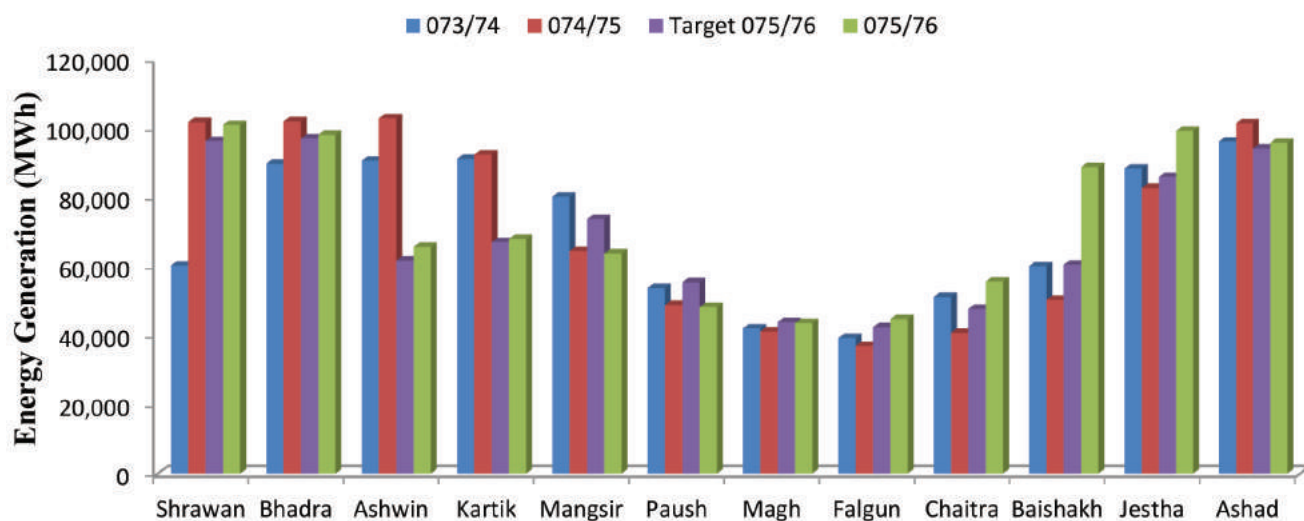
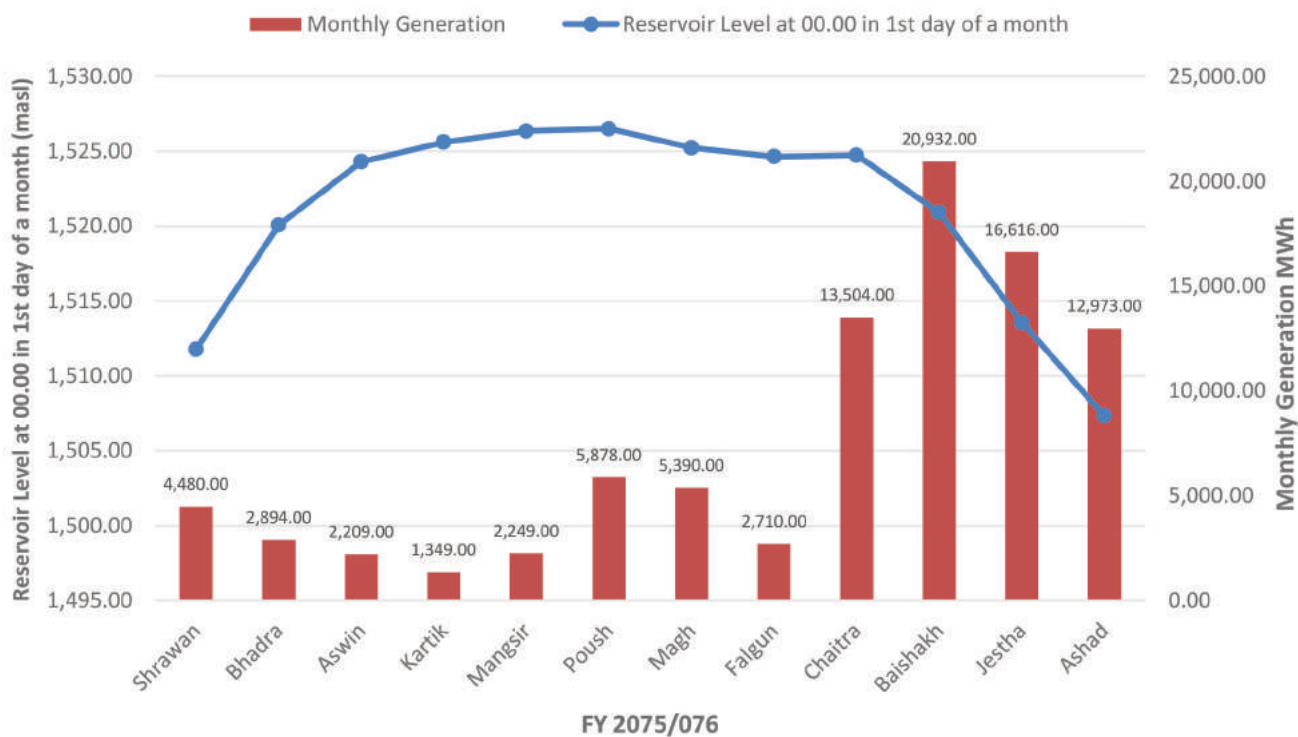


Fig:- Monthly Energy Generation and Reservoir Water Level Statistical graph of FY 075/76



# Kulekhani I Hydropower Station

Unit: MWh

FY/ Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baisakh	Jestha	Ashad	Total
038/39									11,023.00	16,411.00	Shutdown	Shutdown	27,434.00
039/40	661.00	3,318.00	4,194.00	2,964.00	7,462.00	11,007.00	12,477.00	10,932.00	10,261.00	10,607.00	7,958.00	5,576.00	87,417.00
040/41	5,058.00	3,074.00	3,636.00	2,595.00	7,518.00	11,681.00	11,287.00	9,342.00	10,263.00	7,240.00	5,527.00	5,072.00	82,293.00
041/42	9,047.00	5,594.00	4,715.00	6,154.00	7,756.00	13,578.00	10,601.00	8,275.00	9,256.00	10,608.00	8,316.00	10,112.00	104,012.00
042/43	12,940.00	13,222.00	9,020.00	8,437.00	10,020.00	15,062.00	18,512.00	18,999.00	20,453.00	15,848.00	15,866.00	16,032.00	174,411.00
043/44	17,572.00	15,344.00	12,146.00	13,319.00	14,462.00	17,260.00	17,440.00	19,250.00	19,206.00	15,971.00	12,914.00	15,511.00	190,395.00
044/45	15,831.00	17,780.00	14,897.00	14,478.00	17,825.00	18,740.00	19,192.00	17,068.00	16,487.00	16,402.00	14,037.00	15,340.00	198,077.00
045/46	16,808.00	15,482.00	17,011.00	12,135.00	13,273.00	17,985.00	15,563.00	15,431.00	12,139.00	10,019.00	11,219.00	13,818.00	170,883.00
046/47	17,250.00	18,641.00	16,134.00	10,800.00	12,011.00	13,251.00	10,828.00	8,331.00	5,902.00	6,573.00	7,262.00	5,611.00	132,594.00
047/48	3,358.00	10,097.00	11,687.00	13,194.00	12,254.00	25,818.00	27,183.00	21,002.00	15,798.00	10,598.00	5,082.00	7,339.00	163,410.00
048/49	7,903.00	8,981.00	8,081.00	6,418.00	10,551.00	18,133.00	19,607.00	15,286.00	9,750.00	4,424.00	3,352.00	4,617.00	171,103.00
049/50	7,438.00	5,155.00	4,659.00	3,481.00	5,064.00	9,951.00	12,935.00	9,911.00	5,329.00	2,098.00	2,486.00	2,785.00	71,292.00
050/51	353.00	Shutdown	Shutdown	Shutdown	Shutdown	11,709.00	19,997.00	17,296.00	17,423.00	25,476.00	10,929.00	4,598.00	107,781.00
051/52	6,304.00	4,303.00	7,044.00	4,959.00	11,499.00	21,778.00	17,108.00	15,651.00	8,803.00	4,562.00	4,367.00	6,670.00	113,048.00
052/53	10,845.00	17,147.00	11,833.00	6,492.00	8,314.00	13,445.00	15,550.00	14,488.00	26,664.00	15,781.00	14,195.00	12,443.00	167,197.00
053/54	9,904.00	10,694.00	14,945.00	11,385.00	16,612.00	26,676.00	26,586.00	20,735.00	14,542.00	10,996.00	372.00	4,538.00	167,985.00
054/55	7,712.00	6,714.00	16,513.00	7,816.00	4,436.00	7,474.00	15,104.00	13,610.00	10,124.00	9,847.00	11,336.00	10,885.00	121,571.00
055/56	15,562.00	31,986.00	13,346.00	8,025.00	13,204.00	19,380.00	18,481.00	16,867.00	20,205.00	11,864.00	7,649.00	19,168.00	195,737.00
056/57	33,355.00	34,278.00	21,139.00	14,836.00	11,962.00	19,307.00	26,333.00	26,755.00	20,815.00	11,148.00	12,322.00	17,430.00	249,680.00
057/58	9,023.00	17,107.00	16,103.00	9,072.00	15,161.00	18,242.00	24,925.00	25,096.00	19,588.00	5,554.00	5,717.00	10,164.00	175,752.00
058/59	10,551.00	10,315.00	8,885.00	6,617.00	8,098.00	15,108.00	21,475.00	19,134.00	20,027.00	8,026.00	8,070.00	9,115.00	145,421.00
059/60	12,147.00	15,542.00	14,250.00	8,293.00	8,106.00	16,177.00	30,871.00	29,963.00	13,435.00	8,533.00	7,189.00	5,520.00	170,026.00
060/61	10,517.00	9,086.00	11,329.00	9,850.00	9,566.00	20,508.00	19,192.00	19,540.00	16,577.00	11,986.00	9,578.00	12,880.00	160,609.00
061/62	16,627.00	10,798.00	11,960.00	10,665.00	9,223.00	18,091.00	23,347.00	20,983.00	18,940.00	17,813.00	8,448.00	6,890.00	173,785.00
062/63	7,953.00	7,188.00	7,091.00	5,623.00	9,062.00	13,560.00	17,132.00	18,371.00	5,886.00	6,777.00	7,012.00	9,045.00	114,700.00
063/64	8,954.00	7,407.00	6,348.00	6,697.00	12,319.00	20,838.00	20,412.00	10,226.00	15,124.00	14,271.00	9,091.00	6,361.00	138,048.00
064/65	3,742.00	5,672.00	15,260.00	8,382.00	8,412.00	16,467.00	23,738.00	20,110.00	21,113.00	9,013.00	10,518.00	10,589.00	153,016.00
065/66	10,316.00	8,097.00	3,654.00	2,131.00	8,295.00	12,487.00	6,195.00	10,214.00	2,381.00	3,313.00	4,421.00	3,610.00	75,114.00
066/67	4,290.00	4,756.00	5,156.00	4,595.00	6,612.00	12,642.00	10,268.00	9,495.00	11,040.00	6,576.00	5,884.00	5,682.00	86,996.00
067/68	9,633.00	3,171.00	4,396.00	3,927.00	5,545.00	9,594.00	12,680.00	11,999.00	17,468.00	8,149.00	6,726.00	5,598.00	98,886.00
068/69	7,888.00	7,611.00	13,698.00	8,112.00	6,866.00	8,683.00	13,638.00	25,823.00	25,403.00	17,814.00	3,884.00	3,864.00	143,284.00
069/70	4,704.00	2,205.00	464.00	1,148.00	3,958.00	8,608.00	8,291.00	15,504.00	27,394.00	10,560.00	3,630.00	6,363.00	92,829.00
070/71	9,615.00	3,767.00	521.00	2,938.00	4,051.00	4,539.00	9,733.00	16,711.00	15,278.00	20,471.00	5,986.00	474.00	94,084.00
071/72	39.00	11.00	79.00	3,141.00	3,642.00	3,732.00	9,481.00	5,494.00	9,808.00	24,797.00	22,614.00	7,243.00	90,081.00
072/73	626.00	187.00	221.00	716.00	297.00	5,776.00	16,038.00	9,420.00	13,184.00	18,442.00	2,845.00	3,604.00	71,356.00
073/74	3,946.00	566.00	256.00	723.00	918.00	6,253.00	10,743.00	13,289.00	14,232.00	13,226.00	6,141.00	3,109.00	73,402.00
074/75	860.00	313.00	202.00	225.00	202.00	4,345.00	5,283.00	14,322.00	12,845.00	12,669.00	6,428.00	4,437.00	62,131.00
075/76	4,480.00	2,894.00	2,209.00	1,349.00	2,249.00	5,878.00	5,390.00	2,710.00	13,504.00	20,932.00	16,616.00	12,973.00	91,184.00
Till Date Generation, MWh	4,853,024.00												

# KULEKHANI-II HYDROPOWER STATION

## INTRODUCTION

Kulekhani-II Hydropower Station, located at Bhimphedi Rural Municipality-4, Nibuwatar, Makawanpur district is a cascade of Kulekhani-I HPS with installed capacity of 32 MW and annual design generation of 104.6 GWh. It was commissioned in 1986 AD and developed by the financial assistance of Government of Nepal and the Overseas Economic Cooperation Fund (ODCF) of Japan at the cost of NRs. 1240 million.

The plant is designed to develop power utilizing the water from the tailrace of KL-I HPS, further adding the water of Mandu River and through Rapti pumping station. Every year Mandu intake is cleaned after the wet season to allow the filtered water to the intake pond. Likewise, Rapti Pumping Station is operated as per requirement in dry season by doing effective maintenance works to generate power.

The cumulative generation of Kulekhani-II HPS has reached 1993.10 GWh till F/Y 2075/076. The Plant has generated 36.05 GWh in F/Y 2072/073, 37.79 GWh in F/Y 2073/074, 31.75 GWh in F/Y 2074/075 & 44.67 GWh in F/Y 2075/076. In this fiscal year the actual generation (44676.10 MWh) which shows 91.91 % energy is achieved with respect to the target (48608.53 MWh) as well as greater than previous year generation by 12922 MWh. Since the station is cascade of Kulekhani-I HPS, it is operated as per instructions of Load Dispatch Center (LDC) according to the system requirements for voltage improvement & system stability.

Due to heavy rain fall and landslide in steep area during last week of Ashad 2076 in Rapti intake, temporary dam was collapsed and Rapti intake Pump couldn't be operated.

Furthermore, to control the water leakage, Seat ring and Seal ring of MIV of Unit No. 2 will be replaced only after the procurement of parts, and necessary repair and maintenance works will be carried by suitable experts (NEA's as well as OEM Fuji Electric Co. Ltd. team) in next Fiscal year. Preparation for overhauling of Unit No. 1 is on the process and is being planned to be implemented by utilizing the shutdown period of Kulekhani- I HPS during F/Y 2076/77 and as per instructions from Load Dispatch Center (LDC).

In this FY 2075/76 AMR/AMI system has been installed in 5 CT operated Energy meters for automatic remote meter reading purpose.



Fig. Kulekhani II Powerhouse Switchyard





## PLANT OPERATION:

The unit-wise operation record of the power station in the FY 2075/76 is as given below:

Unit	Energy generated in FY 2075/076 (MWh)	Running hour in FY 2075/076 (h)
1	13,535.40	1640.30
2	29,256.60	2262.78
Total	42,792.00	3903.08

## REPAIR & MAINTENANCE ACTIVITIES DURING FY 075/76

### ELECTRICAL SECTION:

- Generator Coil maintenance of unit No-2.
- Supply, Delivery, Installation testing & commissioning of DC110V, 400AH Lead Acid battery.
- Installation of Radio Remote Control system on Electric Overhead Crane at Powerhouse in order to facilitate wireless operation of electric crane.
- AMR/AMI system has been installed in 5 energy meters.

### MECHANICAL SECTION:

- Supply & Delivery of Hydraulics scissors Lift.
- Supply & Delivery of Hydraulic Torque Wrench, Air Compressor & Submersible Pump.
- Repair & maintenance of Rapti Intake's pump 48 KW & 55 KW each.
- Installation of Fuel Dispenser at Powerhouse.

### CIVIL SECTION:

- Maintenance of guest house & colony staff's quarter.
- Surge Tank protection works at Surge Tank Area.
- Mandu dam protection & check wall maintenance works.
- Construction of water tank at staff colony area.
- Construction of temporary reservoir on Rapti intake, which played the major role an increment of the generation.



Fig. Dismantle of Generator rotor of Unit 2



## FUTURE ACTIVITIES

### ELECTRICAL SECTION:

- 6.6 kV XLPE cable replacement at powerhouse.
- Procurement & Installation of SCADA systems at powerhouse.
- Replacement of AVR at powerhouse.
- Procurement of 4000A & 2000A VCB at powerhouse.
- Procurement of CVT and AVR at powerhouse.

### MECHANICAL SECTION:

- Repair & Maintenance of main intake gate seal at Mandu intake.
- Procurement & Installation of blind flange at MIV for Unit No-2.

- Installation of turbine shaft pulling devices at powerhouse.
- Installation of fuel dispenser at powerhouse.
- Repair and Maintenance of MIV of Unit No. 2
- Supply, delivery & Installation of monorail at PH & Store room.

### CIVIL SECTION:

- Mandu filter plant maintenance with filter element replacement.
- Gabion checks wall maintenance at Mandu site.
- Boulder removal & check wall dam maintenance works at Rapti site.
- Surge tank temporary protection works & permanent PCC works for landslide protection.



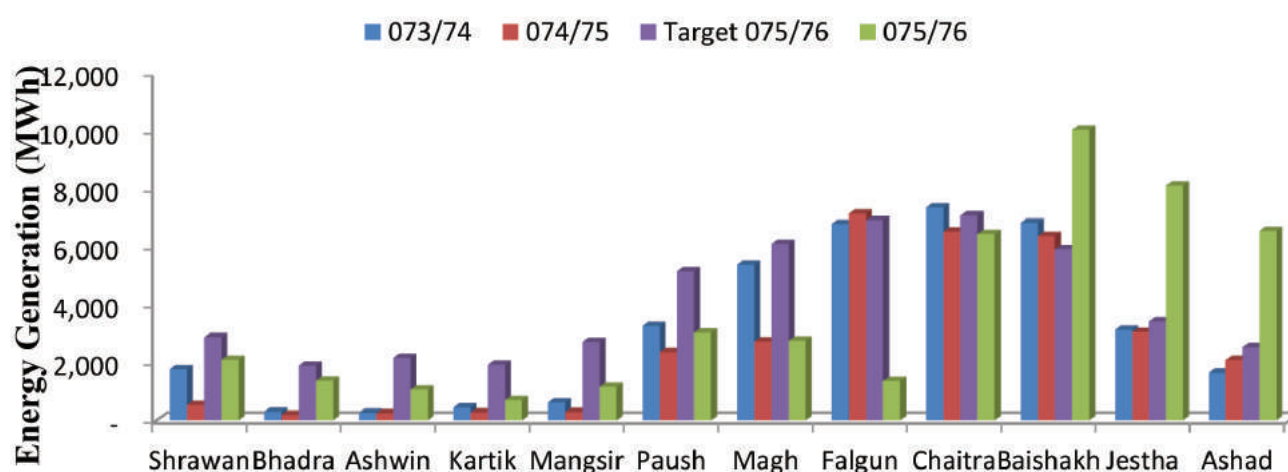
Fig. Generator rotor of Unit 2 after Disassembly



## SALIENT FEATURES OF KULEKHANI II HYDROPOWER STATION

Type of Project	Cascade plant of Kulekhani I Hydropower / Peaking power station
Location	Bhimphedi Rural Municipality-4, Nibuwater, Makawanpur
Installed Capacity	32 MW
Maximum Gross/Net Head	310/284.1m
Power Tunnel	Dia 2.5m, 5874.8 m Long
Penstock	1 No., Steel Pipe, Dia 2.1-1.5m, 843 m
Turbine	
Number and Type	2, Vertical Francis Turbine
Rated Discharge	16.65 m <sup>3</sup> /s
Rated Output	16500 kW
Rated Speed	750 rpm
Generator	
Rated Output	18.8 MVA
Rated Voltage	6.6 kV
Rated Frequency	50 Hz
Power Factor	0.85 lag
Excitation	Brushless 3 phase rotating armature
Power Transformer	37.8 MVA, 132/6.6 kV, 1 No., 3 phase
Transmission Line	132 kV, Hetauda Line-7.9 km, Siuchatar Line-33.4 km

## MONTHLY ENERGY GENERATION







Unit: MWh

FY/ Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
043/44					5,209.90	8,756.50	8,606.00	9,567.60	9,407.30	8,188.20	6,572.80	9,040.10	65,348.40
044/45	10,935.20	11,319.30	7,860.40	7,503.90	8,624.00	8,987.40	9,023.80	8,033.20	7,827.60	7,871.40	6,777.20	8,875.50	103,638.90
045/46	10,111.20	10,605.30	9,002.90	5,121.30	5,844.70	7,970.40	6,880.90	6,866.60	5,433.60	4,555.90	5,222.00	7,597.00	85,211.80
046/47	10,334.10	10,065.50	8,788.80	4,783.50	5,211.30	5,628.50	4,592.40	3,602.90	2,496.90	2,693.80	3,012.80	2,689.80	63,900.30
047/48	2,259.40	6,098.10	6,619.50	5,687.70	4,780.80	10,837.40	11,354.80	8,624.00	6,482.40	4,162.70	1,828.70	3,163.90	71,899.40
048/49	3,781.00	4,789.20	3,737.60	2,546.80	4,307.00	7,490.10	8,134.20	6,207.90	3,750.80	1,797.80	1,420.80	1,850.50	49,813.70
049/50	3,458.00	2,253.90	1,973.20	1,334.40	1,895.40	3,805.20	5,038.60	3,848.60	1,880.40	825.20	948.90	1,181.00	28,442.80
050/51	-	-	-	-	-	4,299.60	7,447.90	6,657.90	6,809.50	10,506.30	3,945.70	1,353.50	41,020.40
051/52	1,969.80	1,487.10	3,030.90	2,191.20	5,392.20	10,591.90	8,447.50	7,838.80	4,265.30	2,155.10	2,047.30	2,988.20	52,405.30
052/53	4,908.90	8,015.50	5,419.40	2,824.80	3,741.70	6,508.40	7,592.60	7,003.80	13,190.70	7,820.70	6,679.20	5,814.40	79,520.10
053/54	4,158.80	4,562.30	6,796.50	5,082.00	7,647.20	13,177.20	13,210.00	10,290.80	6,981.90	5,347.40	Shutdown	706.50	77,960.60
054/55	3,261.90	2,971.70	8,061.90	3,600.10	2,092.00	3,686.00	7,617.60	6,922.90	5,017.90	4,694.50	5,449.60	5,270.40	58,646.50
055/56	7,000.50	15,169.10	5,955.90	3,661.70	6,481.10	9,975.90	9,525.60	8,614.00	10,488.40	5,990.50	3,837.10	9,189.40	95,889.20
056/57	15,450.90	15,853.50	9,467.20	6,456.40	6,323.40	9,980.10	13,560.40	13,886.00	11,027.10	5,740.20	6,334.40	8,678.00	122,757.60
057/58	3,850.30	7,235.30	6,908.70	3,868.10	6,873.80	9,014.50	12,478.40	2,264.40	9,664.30	2,660.50	2,587.70	4,404.60	81,810.60
058/59	4325	4,282.70	3,369.00	2,665.50	3,402.30	6,927.30	10,879.40	9,187.60	9,721.80	3,759.30	3,478.80	3,694.20	65,692.90
059/60	4357	6,405.50	5,734.50	2,935.50	3,213.10	7,160.20	14,674.30	14,489.70	6,333.50	3,786.70	2,975.00	2,035.10	74,100.10
060/61	3898.3	3,048.50	4,229.30	3,903.80	3,972.40	9,045.10	8,488.20	8,934.70	7,506.10	5,118.40	3,537.30	3,896.00	65,578.10
061/62	6,380.50	3,759.70	4,740.00	4,142.40	3,727.70	7,784.90	10,352.10	9,257.80	8,237.40	7,634.30	3,317.10	2,758.30	72,092.20
062/63	3,252.70	2,855.70	2,616.70	2,139.67	3,659.66	5,632.66	7,638.10	8,132.03	2,376.32	2,755.03	2,766.61	3,504.70	47,329.88
063/64	3,451.08	2,730.00	2,276.87	2,564.70	4,842.16	8,862.73	8,938.57	4,359.00	5,604.40	5,453.81	3,632.31	2,276.55	54,992.18
064/65	1,358.57	1,934.36	4,883.82	2,495.20	2,736.47	6,152.70	3,964.62	5,255.31	8,280.74	4,192.96	5,145.41	5,045.12	51,445.28
065/66	4,630.96	3,772.43	1,657.01	1,005.09	4,293.80	6,414.22	3,226.61	5,273.75	1,217.41	1,633.70	2,177.92	1,631.73	36,934.63
066/67	2,063.35	2,092.75	2,434.03	2,241.65	3,497.47	6,541.80	5,022.24	5,041.34	5,408.92	3,448.49	2,833.17	2,893.35	43,518.56
067/68	4,932.56	1,477.54	2,016.09	1,892.44	3,035.70	5,108.52	6,529.30	6,566.41	8,700.85	4,132.94	3,348.07	2,727.71	50,468.13
068/69	3,770.64	3,531.99	6,577.05	3,765.23	3,763.92	4,488.72	7,047.39	13,195.85	12,473.07	8,913.30	2,026.90	1,894.32	71,448.38
069/70	2,467.94	761.29	213.26	585.18	2,072.20	4,396.20	4,208.37	7,746.97	13,621.38	643.70	844.36	2,081.98	39,642.83
070/71	4,258.04	1,754.32	229.81	1,369.02	2,014.89	2,187.53	5,074.60	8,576.35	7,643.06	10,162.69	3,063.33	235.89	46,569.53
071/72	18.90	-	34.58	1,600.46	1,941.80	2,053.90	4,763.71	2,693.50	4,743.93	12,197.84	11,183.94	3,508.07	44,740.63
072/73	300.25	88.15	78.77	358.62	169.89	2,978.27	8,214.05	4,847.98	6,606.60	9,308.91	1,383.51	1,720.35	36,055.35
073/74	1,760.66	297.25	256.12	442.12	618.48	3,265.20	5,387.70	6,789.00	7,367.00	6,831.50	3,137.10	1,643.00	37,795.13
074/75	526.50	185.20	236.90	266.30	280.40	2,350.20	2,727.40	7,151.20	6,523.10	6,364.30	3,051.60	2,091.00	31,754.10
075/76	2,094.00	1,370.50	1,054.30	701.40	1,156.30	3,030.20	2,753.90	1,359.80	6,440.90	10,043.00	8,124.60	6,547.80	44,676.70
Till Date Generation, MWh													1,993,100.21

# CHAMELIYA HYDROPOWER STATION

## INTRODUCTION

Chameliya Hydropower Station has been established after successful inauguration of Chameliya Hydroelectric Project on 10 February, 2018 (Magh 27, 2074). The plant is under Defect Liability Period (DLP) of the contractor M/s KHNP consortium, Korea and M/s CGGC, China till August 14, 2019 (Shrawan 29, 2076).

Electricity generation is being carried out by diverting water of Chameliya River, originates from Mount Api and flows south from the Himalayas crossing major part of Darchula district, finally converging into river Mahakali at Lali, Darchula. It has an installed capacity of 30 MW and designed annual generation of 184.21 GWh.

Chameliya Hydropower Station is a daily pondage run off river hydropower with daily peaking capacity of 6 hrs at minimum discharge. The project was completed on 2074 and the trial generation was continued up to Asadh 32, 2075, thenceforth, Chameliya Hydro Power Station was established in 20 Chaitra, 2074.

The site location of Chameliya Hydropower Station is at a distance of 950 km from Kathmandu and the major city is Dhangadhi (distance 300 km) in the Sudur-Paschim Province (previously Far-western development region).

The Powerhouse is located at Shailya-Shikhar Municipality, Ward No. 1, Balanch, Darchula and the Dam site is located between Marma Gaupalika, Bitule, Darchula. The site is located 85 km from the District headquarter, Khalanga, Darchula.

The cumulative generation has reached 213.85 GWh till the end of FY 2075/76. The total generation during this FY year is 161.395 GWh.



Fig 1. Bird's eye view of facilities of CHEPS power house area.

## PLANT OPERATION:

The unit-wise operation record of the power station till FY 2075/76 is as given below

Unit	Energy generated (MWh)	Running hour (h)	Total Generation Since Commissioning (MWh)
1	82771.87	6,230.14	107902.87
2	78623.67	5,829.34	105952.25
Total	161,395.54	12059.48	213855.12

## REPAIR AND MAINTENANCE ACTIVITIES IN FY 2075/076

Since, the Plant is still under the defect liability period of the Contractor, Chameliya Hydroelectric Project and Chameliya Hydroelectric Station are performing repair work conjointly. The installation of alternate bypass cooling

water supply system for cooling modification purpose and of trashrack cleaning machine for minimization of manual time during cleaning of trashrack will be done in next FY 2076/77.

## ELECTRICAL MAINTENANCE:

- Installation of TOD meters in the powerhouse. Those meters are GSM based meters.
- Repair of excitation transformer.
- Repair of 11 kV dedicated line from powerhouse to dam, damaged due to landslide.
- Maintenance of 132 kV transmission line, damaged due to heavy snowfall in Dadeldhura and falling of trees in areas of Doti, Kailali and Dadeldhura Districts.

## MECHANICAL MAINTENANCE:

- Repair of Turbine Shaft Seal of both units in presence of Contractor M/s KHNP Consortium, Korea and staff of Chameliya Hydropower Station.



Fig . Repair work of shaft seal (Unit #2)

- Mostly during rainy season, high concentration of sediment, debris, leaves, jute pieces etc. in the water causes choking of filter element, which necessitates cleaning of filters, valves, pipes etc. on a daily basis.
- Due to high amount of stone and wooden logs piling in intake trash rack, regular cleaning of trash rack manually is being done on regular basis, which is time consuming and full of risk.



Fig. Cleaning of cooling water filter element.

## CIVIL MAINTENANCE:

As a newly commissioned project some minor civil works are under way which are as follows:

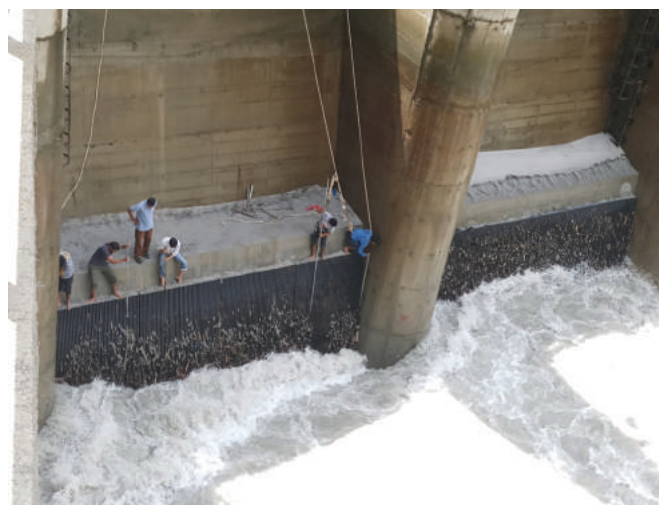


Fig . Removal of stones and wooden logs piled in intake trash rack

- Upgrading works of Gokuleshwor- Balanch access road.
- Minor maintenance and outside coloring of staff quarter buildings.
- Road protection works in the upstream of reservoir, damaged due to impounding of reservoir.

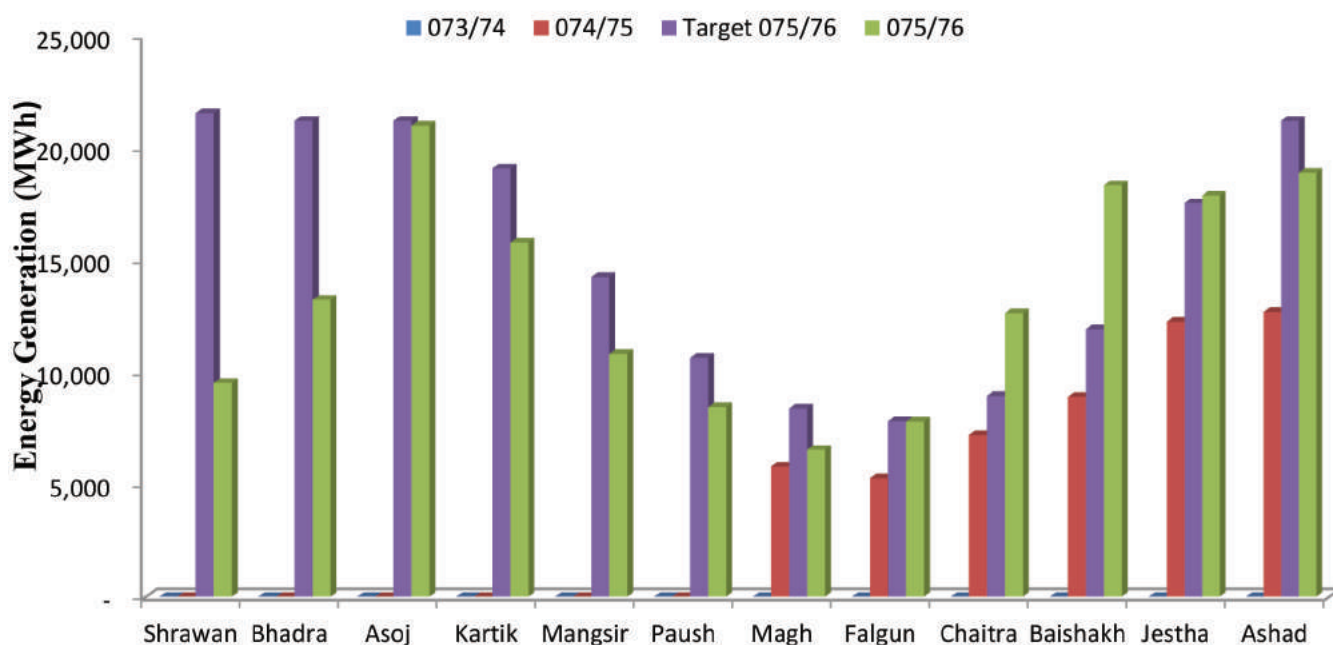




## SALIENT FEATURES OF CHAMELIYA HYDROPOWER STATION

Type of Project	Peaking run of river plant (with 6 hr daily peaking)
Maximum Gross Head	103.70 m
Rated Net Head	94 m
Designed Flow	36 m <sup>3</sup> /sec
Installed Capacity	30 MW
Dam/Spillway Type	Concrete Gravity, 88 m crest length, max. ht. 54 m
Intake	Side Intake
Descending Basin	Underground, 2 nos. (LxBxH, 80mx12mx25m)
Headrace Tunnel	4067 m, horseshoe size 5.2 (m)/4.2 (m)
Surge Tank	Restricted Orifice ( ht. 48.4 m, dia. 8 m)
Penstock	Concrete Lined and Steel Lined, Length 302m, dia. 3.9 m
Powerhouse	Surface, LxWxH, 37.5 m, 23.5 m, 27.4 m
Tailrace	Box Culvert, LxWxH, 714m, 4.8 m, 3.8 m
Turbine	2 Vertical shaft, Francis, rated output 2X15.6 MW, rated speed 428.6 rpm
Generator	2/3-phase synchronous, rated output 2x16.2 kVA
Switchyard	Outdoor, LxB, 57mx 47 m
Transmission Line	Length 131 km, 132 kV single circuits from Balanch to Attariya Sub-station
Annual Average Energy	184.21 GWh

## MONTHLY ENERGY GENERATION



## CHAMELIYA HYDRO POWER STATION

FY/ Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
074/75	0	0	0	0	0	0	5,856.48	5,343.07	7,261.59	8,966.13	12,292.57	12,739.74	52,459.58
075/76	9,579.47	13,272.40	21,010.62	15,820.60	10,862.10	8,507.10	6,609.75	7,861.39	12,686.36	18,363.55	17,908.78	18,913.42	161,395.54
Till Date Generation, MWh													213,855.12

# MULTIFUEL POWER PLANT

## INTRODUCTION

Multifuel power plant is the largest thermal power plant in Nepal. It is located in Bansbari Morang, Biratnagar. Initially, 4 units of 6.5 MW each were installed with financial assistance from Finland Government in FY 1990/91. Later, 2 more units of same capacity were installed in FY 1997/98 to complement the energy deficit during winter and evening peak, which was also financed by Finland Government reaching the total capacity of 39 MW. A major overhauling of engines of all six units has commenced in FY 2009/10 and a contract agreement with Wartsila took place on 10 April, 2010. The overhauling of 6x6.5 MW Wartsila DG sets was successfully completed in 2013. The project was jointly funded by World Bank under Power Development Project, GON and NEA. The project cost was USD 7.7 million. The Power plant was not in operation since Ashad, 2071 B.S. due to legal dispute and disruption of supply of oil from Nepal Oil Corporation. Wartsila Diesel engine uses Furnace Oil (FO) or Light diesel Oil (LDO) as a source of energy. However, unit no. 5 of this station was operated in BS 2074 during SEE examination for at peak hour in Chaitra and generated 22.66 MWh. In order to verify the maintenance of unit no. 5 in operational condition, in FY 2074/75 it generated 15.78 MWh and was operated at emergency and power crisis situation to maintain the stable power system (INPS). The schedule of testing of unit no. 5 was continued for FY 2075/76. The cumulative generation of Multifuel Power Plant has now reached 593.97 GWh from its first run. Recently, the operational condition evaluation and assessment work of all the six units (Generator, Engine and their auxiliary equipment) was concluded by M/s Wartsila India Pvt. Ltd., India in FY 2075/76.

## MAJOR REPAIR AND MAINTENANCE ACTIVITIES DURING FY 075/76

The following are the major Repair and Maintenance Activities accomplished during FY 2075/76.

### ELECTRICAL & MECHANICAL MAINTENANCE:

- Installation, testing and commissioning of 723-digital governor for Generator unit no.5.
- Installation, testing and commissioning of 2V-200 Ah Battery Bank for the control and protection system of 11 kV circuit breakers.
- Repair and maintenance of 11 kV circuit breakers used for industrial feeders- Tanki and Hattimuda, LT line and transformers maintenance works.
- Operation condition evaluation and assessment work of all the six engines concluded by M/s Wartsila India Pvt. Ltd., India.

### CIVIL MAINTENANCE:

- Construction of Open Yard for dumping scraps.
- Construction of Black top access road in office compound.
- Staff quarter maintenance works has been done.



## SALIENT FEATURES OF MULTIFUEL POWER PLANT

Type	Thermal (F.O & Diesel Fueled)
Location	Bansbari, Morang
Installed capacity	39 MW
Engine set	6 Nos., 6.5 MW
Generator	
Number and type	4 nos. of 7.5 MVA capacity from Leroy Somer France 2 nos. of 8.144 MVA capacity from Alstom, France
Rated voltage	11 kV
Rated frequency	50Hz
Rated speed	750 rpm
Excitation	Brushless
Power factor	0.85 (4 Units), 0.8 (2 Units)
Power transformer	11/33kV, 16MVA, 3 Nos.
Transmission line	4 km long, 33 kV Double circuit

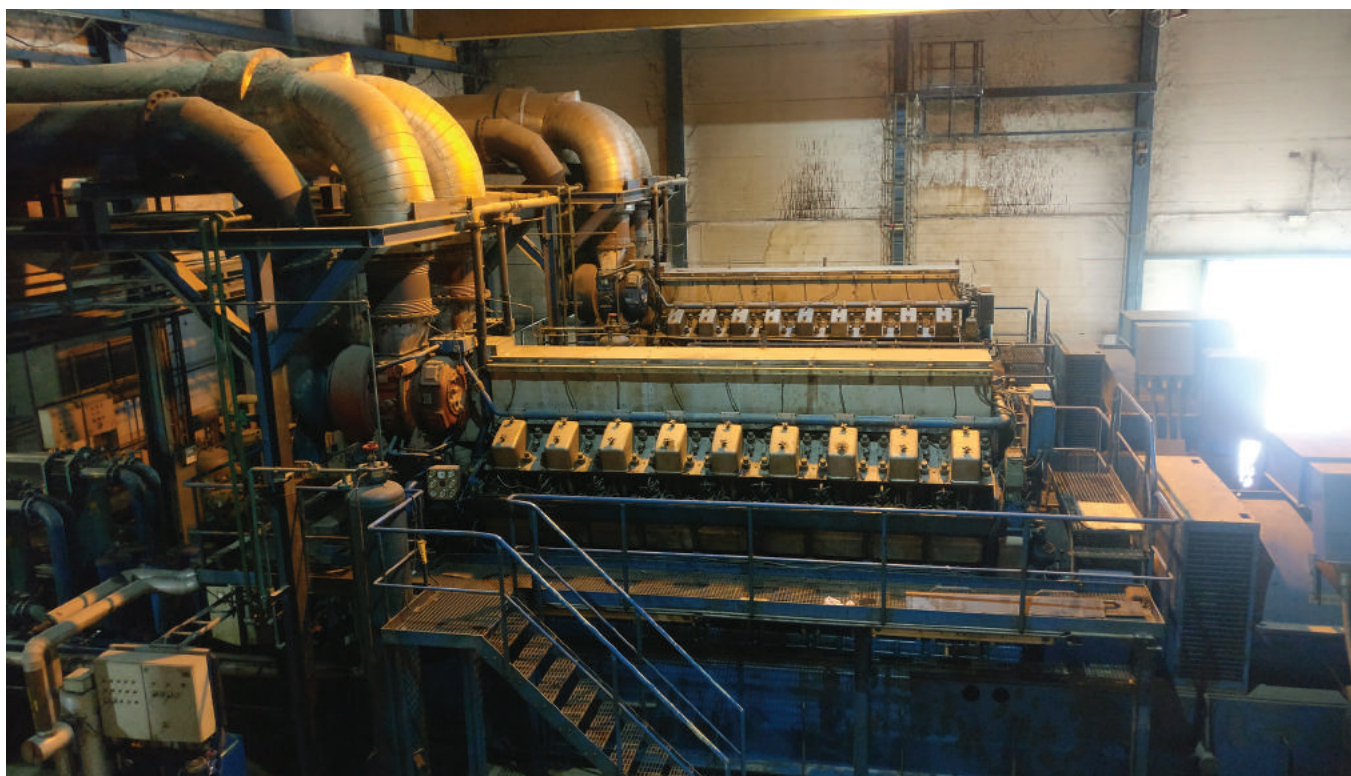


Fig:- Multifuel PowerPlant Engine (26MW capacity)





## MULTIFUEL POWER PLANT

Unir: MWh

FY/Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
047/48													268.20
048/49													20,249.43
049/50	1,111.03	1,416.56	556.22	679.69	2,096.50	5,057.84	4,857.69	4,596.45	5,937.62	3,932.12	3,222.88	2,856.53	36,321.13
050/51	3,943.40	4,432.39	4,159.63	3,477.92	5,192.86	5,925.97	5,241.31	6,585.82	7,347.53	3,635.07	3,620.09	3,100.35	56,662.34
051/52	3,237.66	2,767.38	2,921.34	5,811.13	9,868.98	7,541.43	9,802.40	8,958.52	8,467.92	8,266.18	6,301.35	2,321.81	76,266.10
052/53	1,078.75	823.41	2,330.85	3,094.18	4,325.42	6,318.72	4,737.23	1,105.55	1,617.98	1,050.54	660.52	1,490.95	28,634.10
053/54	3,063.08	2,451.07	1,382.90	1,602.48	1,291.98	1,055.30	1,062.50	4,305.79	3,384.78	2,564.10	3,195.60	3,987.97	29,347.55
054/55	6,297.44	6,293.95	8,306.28	3,587.63	6,628.37	9,942.32	14,140.34	10,078.38	9,584.85	2,344.15	3,874.06	4,585.90	85,663.67
055/56	1,529.63	1,408.49	3,845.79	4,074.81	4,866.75	7,707.28	9,783.25	13,648.86	13,771.55	10,903.60	10,502.73	4,172.33	86,215.07
056/57	2,099.25	1,988.65	2,511.73	1,542.03	3,641.33	9,667.74	8,263.59	9,844.27	6,035.13	5,602.40	1,412.22	709.27	53,317.61
057/58	941.10	1,214.29	868.73	1,076.86	1,550.14	2,037.67	1,603.82	1,512.48	6,390.17	1,826.36	264.32	24.24	19,310.18
058/59	963.09	1,243.02	789.95	522.12	1,493.08	2,693.64	2,479.31	2,332.11	964.37	163.19	4.24	4.42	13,652.54
059/60	-	-	-	105.12	484.02	512.26	1,088.70	758.76	865.19	59.68	141.44	134.00	4,149.17
060/61	637.68	645.63	440.32	635.49	623.12	766.89	775.26	878.97	1,224.35	1,098.84	489.34	526.99	8,742.88
061/62	726.36	540.11	292.06	283.20	534.83	634.85	1,241.72	1,648.62	1,493.71	1,965.33	1,351.56	430.13	11,142.48
062/63	963.89	933.33	582.70	432.39	1,042.37	2,063.71	1,954.24	1,827.91	1,625.27	402.29	329.76	430.16	12,588.02
063/64	443.35	1,031.13	1,282.43	1,092.83	1,485.95	1,983.65	223.30	-	293.91	741.33	774.38	940.64	10,292.90
064/65	566.76	780.24	899.62	728.76	980.28	1,090.76	1,149.06	530.75	751.62	332.07	52.27	4.20	7,866.39
065/66	-	23.64	530.24	227.97	331.11	663.65	719.56	530.34	703.45	645.43	307.17	639.81	5,322.37
066/67	397.98	756.86	819.13	803.50	622.65	1,035.61	1,005.71	1,370.55	1,282.05	1,009.27	131.04	468.30	9,702.65
067/68	661.12	79.67	119.68	301.23	781.68	234.02	2.71	-	108.73	60.02	-	-	2,348.86
068/69	5.74	2.60	5.75	43.92	9.00	4.80	27.48	24.83	325.72	476.01	6.94	-	932.79
069/70	65.97	2.92		22.06	118.18	1,317.06	2,466.54	2,227.10	2,920.66	588.71	225.08	-	9,954.28
070/71	-	76.12	914.50	127.32	42.22	392.02	902.63	1,291.11	1,156.51	-	79.00	-	4,981.43
072/73	-	-	-	-	-	-	-	-	-	-	-	-	-
073/74	-	-	-	-	-	-	-	-	22.66	-	-	-	22.66
074/75													15.78
075/76	-	-	-	-	-	-	-	-	-	-	-	-	-
Till Date Generation													593,970.58

# MEDIUM GENERATION OPERATION AND MAINTENANCE DEPARTMENT

Medium Generation Operation and Maintenance Department (MGO&MD), headed by Director, is responsible for the operation and maintenance of twelve (12) hydropower stations and one (1) diesel power plants with individual installed capacity below 30MW owned by NEA with an objective to maximize energy generation by optimally utilizing generation resources while undertaking rehabilitation, periodic overhauling and maintenance of generating facilities. It has always strived to uphold economy, operational efficiency and an acceptable level of reliability in its drive for improvement. The installed capacity of 12 hydropower stations and 1 diesel power plant with installed capacity below 30 MW is 108.7 MW. The actual generation from the hydropower generating

stations under this department on FY 2075/76 is 409.15 GWh and has achieved an increment of 2.32 % generation as compared to previous fiscal year. Rehabilitation project ongoing under this department is Sundarijal and Tinau with loan assistance from the Asian Development Bank (ADB) under Energy Access and Efficiency Improvement Project (EAEIP). The refurbishment of unit-II of Chatara hydropower station has been successfully completed and the refurbishment Unit-I is on the progress. NEA Management also decided to renovate and modernize Trishuli Power Station and tender of this work has been published. On this F/Y 2075/76, Sunkoshi had great achievement of achieving 100% generation target.



Fig:- Pelton Runner of Puwakhola HPS.

# TRISHULI HYDROPOWER STATION

## INTRODUCTION

Trishuli Hydropower Station (THPS) is constructed on the banks of Trishuli River at Trishuli Bazar, Nuwakot. It was commissioned in 1967 AD in assistance with the Government of India at a cost of INR 140 million with its initial installed capacity of 21 MW having 7 units of 3 MW each. It was later rehabilitated in 1995 AD and upgraded to 24 MW with 6 units each 3.5 MW and one unit 3 MW. It is a peaking run-of-river plant with peaking capacity of 21 MWh and annual design generation of 163 GWh. The cumulative generation of THPS since its first run has reached 5306.66 GWh. It has generated 121.223 GWh in FY 2074/75 and 123.74 GWh in FY 2075/76 with an increase of 2.07%.

## PRESENT STATUS

Currently, six out of seven units are in operation. With all the installation for switchgear and busbar connection, unit-6 shall be put into operation in the near future.

Overhauling of Unit no 1 was accomplished in FY 2075/76 along its MIV, which was not working properly since long time, is now in operation after repair.

In this FY 2075/76 AMR/AMI system has installed in 1 CT operated energy meters for automatic remote meter reading purpose and other 11 energy meters are being replaced soon.



Fig. Trishuli Power House as viewed from opposite bank of Trishuli River





## MECHANICAL PROBLEMS

- Gates and related auxiliaries at head works need a major overhauling
- Seizure of main bearing is a serious issue faced at the monsoon time when the grid failure is frequent
- Although much care is being taken, water leakage mainly from shaft seal occasionally causes problems

## ELECTRICAL PROBLEMS

- The instrumentation, control and monitoring system are not functioning properly and needs to be upgraded
- Fire protection system is not functioning due to which switch gear caught fire and suffered serious damage

## OTHER RELATED PROBLEMS

- With excess silt deposit in the balancing reservoir, the plant does not operate to its designed peaking capacity.
- Choking of B-0 point is a common issue during monsoon which also obstructs the discharge to the canal and reduces the generation.
- Insufficiency of required personnel for the O&M works has also been a major problem for this plant.

THPS had undergone some series of fire accident at its switchgear system. On Ashoj 25, 2075 high voltage caused severe damage in the DC system of the plant. Four nos. of units were later restored on Asoj 30, 2075. The accident recurred when the maintenance work of unit no.2 breaker was being carried out on 8 Mangsir, 2075. The unit was restored on 26 Poush, 2075. On 18 Poush, 2075, switchgear of unit-6 caught fire and took a serious damage. This in turn affected the operation of other units, however the bus cabinet was restored within a week. New breaker for unit-6 has been already installed and control circuit are being checked after which unit shall be put into operation soon.

In this FY 2075/76 AMR/AMI system has installed in One CT operated energy meter for automatic remote meter reading system and 11 old meters are going to be replaced soon.

## MECHANICAL MAINTENANCE

- Overhauling of unit no.1



Fig. Installation of MIV of unit no. 1

- Repair of MIV of unit 1 and its hydraulic circuit with addition of new power pack system.
- Two nos of stoplog gate were added at the forebay opening due to which there is separate gate for each 4 penstocks.



Fig. Installation of stoplog gate at forebay

- The dredger facility installed at the balancing reservoir has been renovated, with all the power cables has been changed, and in normal operation.



Fig. Overhauling of unit no.1

**SALIENT FEATURES OF TRISHULI HPS (after upgradation)**

Type	Peaking-run-of-river
Location	Trishuli, Nuwakot
Installed capacity	24MW (peaking capacity 21MW)
Annual average energy	163 GWh
Maximum gross head / Net head	51.4 m
Catchment area	2600km <sup>2</sup>
Minimum annual flow	45.66 m <sup>3</sup> /s
Dam	139.6m length
Total length of the waterways	4,792m
Penstock	71.66m long, Ø 2.3m, 3 Nos., steel lined 89m long, Ø 1.5m, 1 No.s, steel lined
<b>Turbine</b>	
Number and Type	7, Francis
Rated discharge	7.8 m <sup>3</sup> /s
Rated output	3,620 kW
Rated speed	500 rpm
<b>Generator</b>	
Rated output	3889 kVA
Rated voltage	6.6 kV
Rated frequency	50 Hz
Power factor	0.90
Transmission line	66 kV, 27.36 km, Double circuit



## ELECTRICAL MAINTENANCE

- Repair and maintenance of switchgear and busbar.
- Replacement of bushing CT of main transformer.
- Installation of new breaker for main transformer and local supply.
- Renovation of EOT crane installed at powerhouse was done including the replacement of old DSL and operating panel boards. It has now been equipped with radio remote control facility.
- AMR/AMI system has been installed for one energy meter for automatic meter reading.

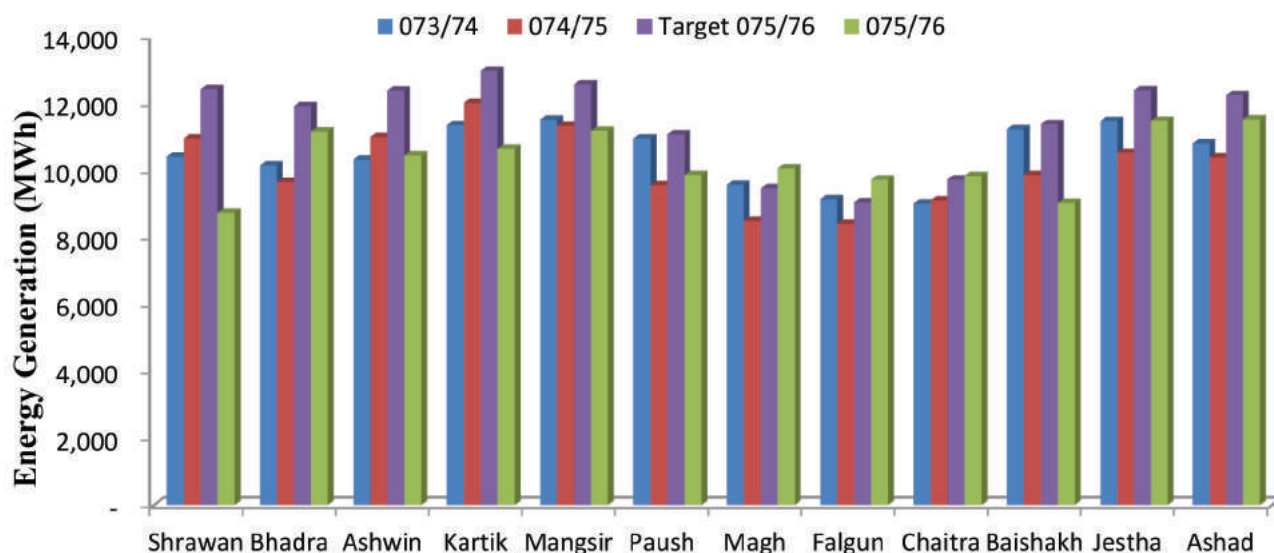
## CIVIL MAINTENANCE

- Protection Fencing work at the canal area
- Powerhouse access road maintenance works
- Repair and renovation of Staff dormitory

## OTHER WORKS

- Extensive workout has been carried out for the rehabilitation and modernization of THPS in this fiscal year for which the tender publishing has already been done.

## MONTHLY ENERGY GENERATION







# DEVIGHAT HYDROPOWER STATION

## INTRODUCTION:

Devighat Hydropower Station (DHPS) is the cascade hydropower Plant of Trishuli power Plant. It is located at Battar, Nuwakot with installed capacity of 14.1 MW and annual design generation of 114 GWh. It was commissioned in 1984 AD and developed in assistance from Government of India and Government of Nepal with the total cost of NRs. 750 Million including transmission lines. The rehabilitation of all three units at a cost of INR 338.15 million was successfully completed by the contractor Bharat Heavy Electricals Ltd. (BHEL) and handed over to NEA on July 13, 2011. The capacity of the units was improved and upgraded to 15MW. Presently, all three units are in normal operation. The operational capacity is based on the availability of the flow released from the upstream Trishuli Hydropower Plant. After the successful completion of Renovation, Modernization & Upgrading (RMU) project in Devighat in fiscal year 2010/11, the generation has been satisfactory and is limited only by the obstacles in generation faced by upstream of Trishuli. This Plant had generated 97.6 GWh in FY 2073/74 and 86.238 GWh in FY 2074/75. It has generated 86.85 GWh in 2075/76 fiscal year. Cumulative generation of Devighat hydropower has reached 2,968.122 GWh from its first run.

## Present status:

Currently, all 3 units are in operation. Correspondence and Preparation for overhauling of unit number 3 is on the process and is planning to implement by utilizing the shutdown period of Trishuli HPS during coming F/Y 2019/20. All necessary general accessible inspection has been carried out. Purchasing of Proprietary items

has also been put forward for approval to the central office. Governor and SCADA system need repair and maintenance which will be carried out by suitable experts in next fiscal year. Turbine excessive leakage was minimized by using proper turbine shaft seal but the groove formation in the shaft sleeve causing inevitable leakage will be repaired during the period of overhauling process in the coming fiscal year.

In this FY 2075/76 AMR/AMI system has installed in 12 CT operated energy meters for automatic remote meter reading purpose.



Fig: Replacement of damage rotating diode



## PROBLEMS RELATED TO CIVIL STRUCTURE

The deposition of silt in forebay shows that Trishuli River carries large quantity of silt that erodes the runner, guide vanes and causes choking problem in canal trash rack, fore bay, bearing oil cooler, Generator Air Cooler etc. so the bidding process of submersible slurry pump has been carried out which will be completed in coming fiscal year.

The tailrace of Trishuli HPS is intake of Devighat HPS, mostly water flows through the open canal and due to open canal structure DHPS is facing the movement of local bodies including domestic animals which generally helps to increase of debris/gravels in water canals and ultimately decreases the generation even though the necessary cleaning is carried out. Sometimes the death of local people or cattle in the power canal causes the plant shut down to search the body which effects the generation.

This year repair works on Samari khola syphon was carried out but this needs to be done on yearly basis due to erosion on structure caused by high speed derbies (mostly large stones) during monsoon. Fencing works (to protect from people and animals) at some portions on the side of open canals, bridge slab & road maintenance from colony to office, JD boarding school building works were carried out but this works still need to be extended. Total of 2 store buildings were demolished of which one has been built still 1 store building in in process of demolition and one will be demolished in next F/Y budget arrangement for new store building has been done.

## MECHANICAL PROBLEM

There seems to be water leakage in MIV of unit no. 3 and therefore repair work will be carried out during shutdown period very soon. Water leakage problem from shaft seal for which maintenance work are carried out to minimize the leakage by effective sealing but the maintenance of groove formation in sleeve is needed which will be done in next year. There is small portion of Leakage from Escape-Gate which will be dealt with this F/Y.

## ELECTRICAL PROBLEMS

Governor system is not functioning properly therefore needs to be repaired or replaced with new governor

system which will be decided only after condition monitoring by an expert. Devighat power house is facing problems in SCADA system and have planned to solve the problem with the help of experts.

## REPAIR AND MAINTENANCE ACTIVITIES:

The following activities were accomplished during FY 2075/76.

### MECHANICAL MAINTENANCE:

- Motorization works of flushing gate instead of manual operation.
- Maintenance of Sluice Gates, Intake Gates, Forebay Gates
- Repair of Governor System
- Maintenance of Unit No.3 to prevent excessive Vibration.
- Repair & Maintenance of bypass valve of unit No. 1
- Maintenance and replacement of rubber seals of escape gate
- Maintenance of dewatering & drainage pump
- Replacement of turbine shaft seal
- Replacement of turn buckle and pin with check plate of guide vanes
- Replacement of new Gate valves in pipeline of cooling water system and pressure valve in Governor OPU system.



Fig: Turbine and Runner inspection with ceramic paint in runner





## ELECTRICAL MAINTENANCE:

- Inspection and Repair of unit no 2 Excitation System with replacement of damage rotating Diode was carried out
- Replacement of 66kV bus voltage Transformer at the switchyard.
- Replacement of 66 kV for Devighat Chabel transmission line
- Repair of 33 kV VCB breaker for Dhading Feeder line was carried out
- 66KV SF6 breaker maintenance by replacing new link pin (existing link pin found to be broken) of connecting system
- Installation of new Line relay and control panel for Devighat – Dhading power line was completed.



Fig: During maintenance of outdoor CT

## CIVIL MAINTENANCE:

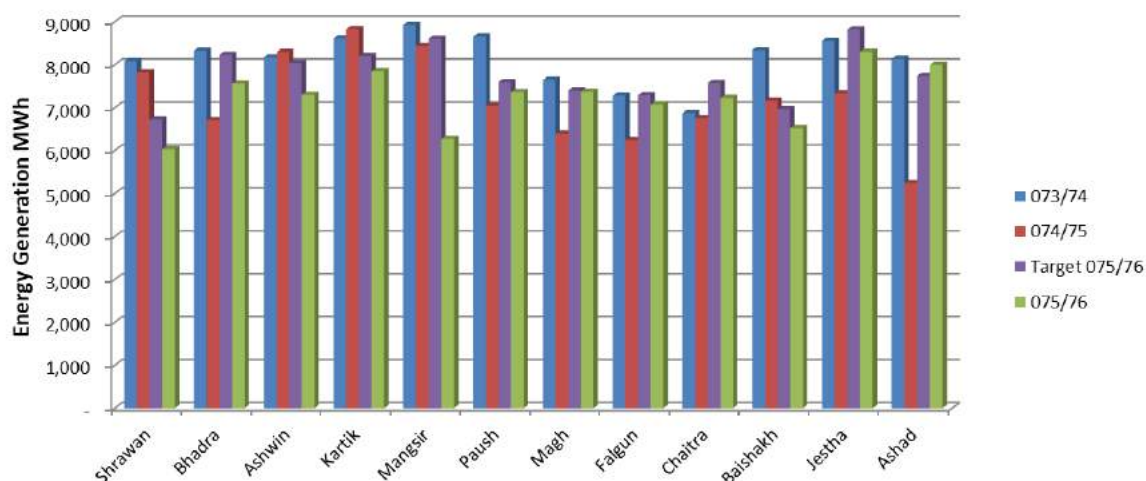
- Installation of AMR/AMI system in 12 Energy meters.
- Removing of Debris from canal and trash rack, Cleaning of drain, bush cutting etc.
- Repair of Samari khola syphon
- Removal of sediments and debris from Forebay.
- Additional water flow from Samari Khola was added to the water canal to increase the Discharge
- Fencing works (to protect from people and animals) at some portions on the side of open canals
- Repair of bridge slab & road from colony to office
- Construction of new store building for storing of valuable spares
- Repair of water leakage due to earthquake in expansion joints (only some portions) of the concrete structures of ground floor of power house
- Construction of New quarters (for 6 families) at Colony area started and completion will be in next year.



Fig: Removing of sand, silts from forebay

**SALIENT FEATURES OF DEVIGHAT HPS**

Type	Cascade of Trishuli Hydro Power Station
Location	Charghare, Bidur Municipality-06, Nuwakot District
Installed capacity	15MW (after rehabilitation)
Annual average energy	114GWh
Maximum gross head / Net head	40.5m, 39m
Catchment area	4150 km <sup>2</sup> (upto Trishuli diversion)
Average annual flow	45.3 m <sup>3</sup> /s
Net head	40.5m, 39m
Total length of the waterways	4.5 km from Trishuli HPS tailrace to Devighat HPS forebay
Penstock	3 Nos., Ø2.5m, steel lined
<b>Turbine</b>	
Number and Type	3, Vertical Francis
Rated discharge	14.3m <sup>3</sup> /sec
Rated output	5.03MW
Rated speed	333.3rpm
<b>Generator</b>	
Rated output	5MW
Rated voltage	6.6kV
Rated frequency	50Hz
Power factor	0.8
Power transformer	6.3MVA, 6.6/66kV, 3-phase, 3 Nos.
Transmission line	66kV, 37km(Devighat -Chabel), 28km(Devighat - Balaju), Double circuit

**Monthly Energy Generation**





# GANDAK HYDROPOWER STATION

## INTRODUCTION:

Gandak Hydro Power Station is located at Pratappur Gaunpalika ward no. -7, District: Nawalparasi, Nepal about 235 kms from Kathmandu and about 5 kms North from Indian boarder point called Jhulenipur, District: Mahrajgunj, Uttar Pradesh. The powerhouse is a part of irrigation cum power generation scheme on Gandak River. A barrage has been constructed on the river Narayani at Bhainsalotan (Balmikinager, Bihar) on Indo-Nepal boarder. From the barrage, two canals take off namely Gandak Main Eastern Canal and Gandak Main Western Canal. This Power Station is located on the Gandak Main Western Canal approximately 18km downstream of barrage at Surajpura, Nepal. As the canal is mainly meant to meet the irrigation needs for Uttar Pradesh, India, the discharge through canal is regulated accordingly.

The plant has three Horizontal mounted tubular bulb turbines; low head high discharge Kaplan Turbo-Generators of 5 MW each with aggregate capacity of 15 MW and annual design generation of 106.38 GWh. The project was built in assistance with the Government of India and Government of Nepal with the total cost of NRs. 170 million.

The cumulative generation of the station has reached 1026.626 GWh in 2075/76 from the first run. It has generated 17.495 GWh in FY 2074/75 and 11.95 GWh in FY 2075/76 with a decrease of 31.69 %.The actual generation of this year is 11.95 GWh which is 35.8 % of its target generation 33.36 GWh.

## PRESENT STATUS:

Presently, Unit no. 1 is in shutdown condition due to damage on generator's stator coil for last 12 years. The generation is disrupted mostly due to long shutdown (i.e. more than three months canal shutdown) of Main Western Canal for inspection and maintenance by Irrigation Department, Bihar, India. Sometimes due to local issues & disagreement with MWC division with local people causes disturbance in canal. The frequent system changing, high water level in tailrace controlled by Irrigation Dept. UP, high sediment & choking of trash rack and frequent tripping due to very low voltage from Indian grid also interrupt power generation. The plant is strongly seeking rehabilitation for optimum performance and reliable operation of machine.



Fig: Replacement of runner O-ring



Fig: Headworks gate operating system



Fig: Overview of powerhouse interior

Among three units the unit no. 2 is in operation & unit no.1 is out of operation for last 12 years due to problem in generator's stator coil & unit no. 3 is under breakdown since Magh 2075 due to problem in turbine guide bearing and other components.

In this FY 2075/76 AMR/AMI system has installed in 3 CT operated energy meters for automatic remote meter reading system.

## REPAIR AND MAINTENANCE ACTIVITIES:

The following activities were performed during FY 2075/076.

### MECHANICAL WORKS:

- Replacement of rubber O-ring of runner blade and runner blade servomotor of unit no. 3.
- Replacement of guide vane servomotor of unit no. 2.
- Replacement of oil divider ring in unit no. 2.
- Replacement of carbon seal (shaft seal) of unit no. 2.
- Replacement of guide vane bush and seal of unit no. 2 & 3.
- Corrosion resistant coating on remaining towers of 132 kV switchyard.
- Replacement of lifting beam of old gantry crane.
- Replacing of checker plate & installation of beam at tailrace gate no. 2.

### ELECTRICAL WORKS:

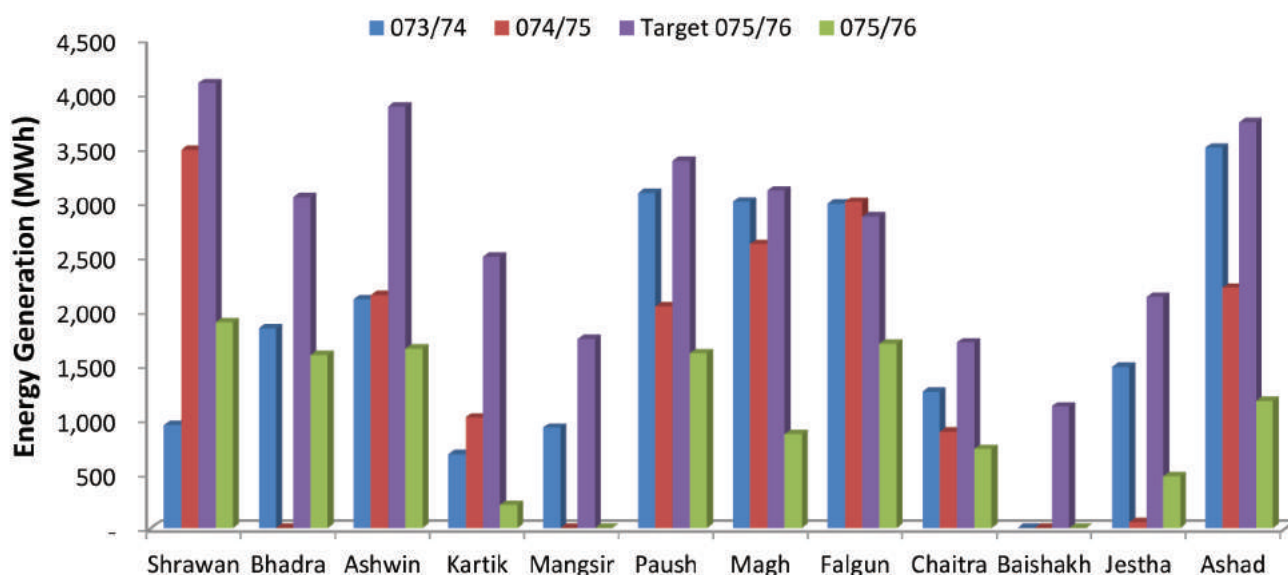
- Replacing of PT in 132 kV switchyard.
- Repair of excitation system of unit no.2
- Repair of governor of unit no.2.
- Installation of water level sensor at upstream and downstream.
- Replacing of temperature sensor & meter in unit no. 2 and in-house electrical wiring.
- AMR/AMI system installed in 3 energy meters.

### CIVIL MAINTENANCE WORKS:

- Repair and painting of staff quarters, office and store building.
- Construction of remaining boundary wall in office premises.
- Construction of shed for vehicle parking in powerhouse and office area.
- Repairing of guard post and powerhouse boundary wall.

**SALIENT FEATURE OF GANDAK HYDROPOWER STATION**

Location	Pratappur Gaunpalika-7, Nawalparasi
Installed capacity	15 MW
Annual Design Generation	106.38 GWh
Maximum gross head/Net head	7.59m/6.09m
Total length of the waterways	18 km canal
<b>Turbine</b>	
Type	Adjustable Blade Tubular Turbine
Number of units, Type	3, Kaplan
Rated discharge	103.84m <sup>3</sup> /s
Rated max output	5.52 MW
Rated speed	107 rpm
<b>Generator</b>	
Type	Totally Enclosed Synchronous Generator
Rated output	5.9 MVA
Rated Current	516 Amps
Rated voltage	6.6 kV
Rated frequency	50 Hz
Rated Power factor	0.85 (Lag)
<b>Power Transformer</b>	10 MVA, 6.6/132 kV, 2 Nos.
Transmission line	132kV, 20 km (Balmikinagar), 18 km (Bardhaghat), single circuit
Project Hand Over to NEA	31 August, 1981 AD
Project Financed BY	GOI, GON
Total Project Cost	NRs. 17 Crores

**Monthly Energy Generation**





# MODIKHOLA HYDROPOWER STATION

## INTRODUCTION:

Modikhola Hydropower Station is a run-off-river hydropower station, located at Dimuwa, Parbat with installed capacity of 14.8 MW and annual design generation of 92.5 GWh. It was commissioned in 2000 AD and developed in assistance from EDCF (Korea). Government of Nepal and NEA at a cost of USD 30 million.

After its successful commissioning in 2000 AD, the plant operation has been adversely affected especially during monsoon due to sub-optimal design and inadequate sediment handling capability of the Desanders as the Modikhola brings high content of abrasive sediments. Consequently, the abrasive sediments with high velocity while passing through the Turbines, severely erode turbines, butterfly valves and wicket gates along with other turbine auxiliaries such as Generator Thrust bearing oil coolers, Generator air coolers, Turbine guide bearing oil coolers etc. The cumulative generation of the station has reached to 1009.789 GWh upto 2075/76 from the first run. It has generated 66.422GWh energy in FY 2074/75 and the 69.301 GWh in the fiscal year 2075/76, with increase of 4.33%.



Fig: Modikhola Powerhouse & Switchyard

## PRESENT STATUS:

The overhauling of Unit-1 was successfully completed with the plant's own manpower second time in a row following the successfully completion of Unit-2 overhauling in the previous FY 2074/75. Overhauling of Unit-1 includes replacement of Francis runner, labyrinth ring. Sealing ring, 20 nos. of Guide vanes, repair & maintenance of Head cover, Bottom ring, Draft tubes etc. The severe erosive damage was observed at the bottom ring, head cover, stay vanes & Draft tube inside surface during the overhauling of Unit-1 comparison with the previous overhauling of Unit-2. During the reporting period, a new Cooling Water Filtration System (In-line Strainer & Auto Self-Cleaning filter) was installed & commissioned successfully at both units in parallel with the existing manual type of duplex filtration system. The new system being automatic, the maintenance burden to the plant operator due to frequent cleaning of choked filter element has been reduced significantly. However, the performance of the new system is under testing during this monsoon. In addition to that a Gantry structure with the 5 Ton Monorail Hoist was successfully installed at the Powerhouse. With the installation of this Gantry crane, the life of maintenance crews has been very much easy since heavy components up to 5 Ton can now be easily and conveniently taken in & out of the Powerhouse and any other electrical & mechanical components can now be easily lowered down at the Generator floor inside the Powerhouse without the help of Mobile crane. Generator thrust bearing oil cooler having 48 tubes has been installed at both Units replacing old damaged oil coolers having 36 tubes. The performance of both coolers is found to be satisfactory so far. New SS Generator Air



Cooler has been installed at Unit-1 & the performance of cooler is also found to be satisfactory since the new coolers have significantly reduced the turbine guide bearing temperatures with fair temperature stability.

Increased debris and sludge in the Modikhola has been observed possibly due to ongoing road construction works prompting landslides and due to nearby construction of Middle Modi Hydropower Project. High depositions of sand on Intake especially in box culvert and regulation poundage occur in rainy season. Choking of the trash rack and desander basin continued this year as well, which highly affected the flow of water into the turbine and sometimes affecting the power generation as well.

The performance of the plant is largely affected during rainy season due to excessive sediment load thereby reducing capacity of regulating pondage and desander. The rehabilitation work was completed last year by M/S Lumbini/ Prakritik JV. Although the construction of civil and hydro-mechanical works have been completed last year under the rehabilitation project, the testing & commissioning of bypass control gate still remains to be outstanding. The effect of by-pass system constructed under Modikhola rehabilitation project on the power generation from MKHPS is yet to be tested during coming dry season after successful testing commissioning of the by-pass control gate.

## REPAIR AND MAINTENANCE ACTIVITIES:

The following activities were accomplished during FY 2075/76.

## MECHANICAL MAINTENANCE:

- A new Cooling Water Filtration System (In-line Strainer & Auto Self-Cleaning filter) was installed & commissioned successfully at both units.
- A Gantry structure with the 5 Ton Monorail hoist was successfully installed at the Powerhouse.
- Overhauling of turbine Unit-1 by replacement of Francis runner, labyrinth ring, sealing ring, wearing plates for head cover & bottom ring.
- Replacement of old SS Generator Air Coolers with new ones in Unit-2.
- Replacement of 36 Tubes Generator thrust bearing oil coolers at both Units with new 48 tubes oil coolers.
- Replacement of old Turbine Guide bearing oil coolers at Unit-1 during overhauling.
- Modification, repair & maintenance of U/S desander gate hoisting system with new modified gate spindle & other new gate parts.
- Installation & testing of new driving system of desander sand purging gate & regulating pondage outlet gate.
- Repair & maintenance of inlet & outlet pipes for SS Generator Air Coolers & Generator thrust bearing oil coolers of both Unit-1 & Unit-2 by replacing with new set of pipe line.



Fig: Installation of Generator Rotor shaft during Unit-1 Turbine Overhauling





## ELECTRICAL MAINTENANCE:

- Replacement of the 15 MVA, 132/33 kV power transformer situated at 132 kV substation by 30 MVA transformer.
- Replacement of one set of 132 kV Pokhara grid side SF6 Circuit Breaker on 132 kV substation.
- Replacement of two sets of 33 kV VCB on 33 kV substation.
- Replacement of 11 kV indoor incomer panel for 11 kV intake and local feeder.
- Replacement of 400 V ACB for internal distribution system.

## CIVIL MAINTENANCE:

- Plastering of quarter buildings, Painting rooms and plaster surface, floor finishing works, construction of parapet wall etc.



Fig: Installation of 30 MVA Transformer at 132 kV Switchward



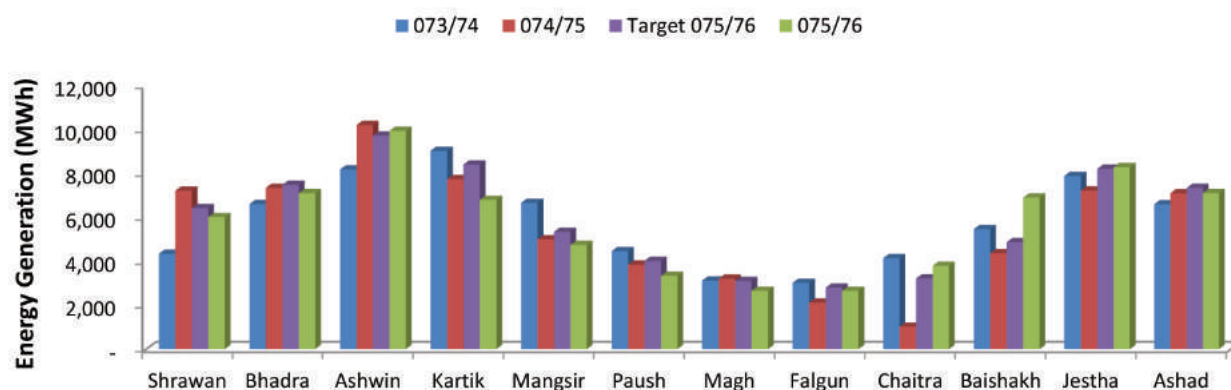
Fig: Installation of SF6 Circuit Breaker at 132 kV Substation



## SALIENT FEATURES OF MODIKHOLA HPS

Type	Run of the river
Location	Dimuwa, Parbat
Installed capacity	14.8MW
Annual average energy	92.5 GWh
Rated Net head	66.96m
Catchment area	510km <sup>2</sup>
Average annual flow	27.5m <sup>3</sup> /s
Total length of the waterways	61.0m(canal), 2071m(tunnel)
<b>Turbine</b>	
Number and Type	2, Francis
Rated discharge	25m <sup>3</sup> /s
Rated output	7.6 MW
Rated speed	428.6 rpm
<b>Generator</b>	
Rated output	8260 kVA
Rated voltage	6.6 kV
Rated frequency	50Hz
Power factor	0.9
Power transformer	7.8/8.3 MVA, 6.6/132 kV, 3 phase
Transmission line	Single circuit 132 kV, upto Lekhnath s/s

## Monthly Energy Generation





## SALIENT FEATURES OF MODIKHOLA HPS

Unitr: MWh

FY/ Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Asadh	Total (MWh)
057/58	-	-	-	6,059.90	5,167.90	3,994.20	3,316.90	2,585.90	2,319.00	5,144.00	9,439.80	3,418.90	41,446.50
058/59	2,418.20	2,567.90	5,000.30	5,049.20	5,750.10	3,513.90	3,152.60	2,684.70	4,166.40	5,781.20	7,099.90	3,989.60	51,174.00
059/60	2,925.90	5,785.20	4,915.90	4,475.00	5,140.30	3,985.50	3,142.30	2,878.80	3,866.50	5,282.30	6,965.70	5,011.60	54,375.00
060/61	2,223.90	992.4	5,147.20	5,986.40	4,913.80	3,853.40	2,945.50	2,923.20	3,836.30	4,624.40	5,303.10	2,676.90	45,426.50
061/62	3,030.60	1,098.00	5,486.30	5,506.00	4,990.10	3,704.60	1,649.70	2,372.10	2,106.30	3,898.10	5,056.40	3,282.40	42,180.60
062/63	2,064.90	3,651.40	4,567.80	4,173.10	4,419.70	4,190.90	3,551.60	3,451.10	3,638.80	4,136.70	4,569.70	4,037.60	46,453.30
063/64	3,413.50	7,894.60	9,335.50	6,693.90	4,840.80	3,941.30	3,058.20	3,501.30	5,126.50	6,366.00	7,370.60	5,806.70	67,348.90
064/65	3,182.20	4,179.10	6,157.80	7,452.10	5,600.50	4,320.00	3,054.30	3,023.90	3,332.40	5,351.80	6,551.70	1,696.10	53,901.90
065/66	1,923.90	5,419.10	9,293.80	8,187.10	5,684.70	3,846.90	3,307.20	2,754.90	3,133.50	5,107.60	6,215.40	7,646.60	62,520.10
066/67	5,941.20	3,913.80	4,312.90	4,974.70	4,813.70	3,735.70	2,667.50	2,426.60	4,013.70	4,823.00	4,989.60	4,400.50	51,012.90
067/68	3,661.30	5,073.20	8,786.20	8,321.80	5,153.80	3,955.90	2,917.90	2,199.05	2,923.40	4,475.70	6,653.30	5,839.80	59,961.80
068/69	3,021.10	4,081.90	2,257.30	3,313.10	2,976.10	2,564.00	2,165.20	2,269.10	3,300.70	4,491.10	3,313.80	855	34,608.40
069/70	750.7	2,013.30	4,060.30	3,612.60	2,444.10	2,309.00	2,066.60	1,830.00	2,640.50	2,905.60	3,524.80	2,561.10	30,718.60
070/71	3,071.80	3,522.20	4,795.80	2,274.30	3,230.60	3,521.90	2,607.70	2,779.30	3,182.80	3,963.50	5,160.70	3,527.20	41,637.80
071/72	2,357.80	5,711.50	6,089.80	8,427.40	5,896.20	4,585.90	3,360.50	3,418.80	3,902.40	3,319.60	5,989.50	5,895.80	58,955.20
072/73	4,510.70	6,863.60	8,421.70	7,294.00	5,216.90	3,890.20	3,079.60	2,728.50	3,568.00	4,752.40	7,164.40	5,297.20	62,787.20
073/74	4,344.10	6,607.30	8,188.80	9,023.00	6,664.20	4,465.60	3,128.40	3,022.40	4,143.20	5,476.80	7,891.00	6,601.60	69,556.40
074/75	7222.6	7349.2	10200.2	7746.9	5005.1	3847.3	3213.8	2115	1028.3	4361.5	7231.7	7101.1	66,422.70
075/76	6027.5	7106.7	9937.5	6801.6	4749.2	3343.1	2656.9	2562.2	3807.8	6907.6	8286.7	7114.8	69,301.60
Till Date Generation, MWh													1,009,789.4



# HETAUDA DIESEL POWER PLANT

## INTRODUCTION:

Hetauda Diesel Power Plant, with installed capacity of 14.41 MW is located at Hetauda, Makawanpur. The first phase with three sets of English Units was commissioned in 1963 and the second phase with four sets of Russian Units was commissioned in 1980 in assistance from British Government and Government of Nepal.

The plant operates during peak, however, the soaring fuel price has made its operation costlier compared to that of hydropower stations. The plant contributes to generation mix, provides operational flexibility and strengthens system reliability and hence, has great importance in fulfilling peak demand to some extent. However, the exorbitant fuel price restricts its operation and NEA has to receive some sort of subsidy from GON as compensation for its operation. Presently, the plant has been operating at capacity of 10 MW in need of system peak load and for regular testing purposes.

The cumulative generation of the plant has now reached 155.4 GWh from its first run. The station has generated 0.127 GWh in FY 2074/75 and 0.116 GWh in FY 2075/76.



Fig: Machine hall of the Power Plant

## PRESENT STATUS:

The seven number of units installed in the station are in stand by condition to operate. The plant is in a condition to generate power up to 10.5 MW. The existing crane and its mechanism present in the power house are semi-automatic, partially manual and overall accident prone hence, in need of modification. The two units of fuel separator, which were installed at the time of commissioning of the power plant, are out of operation for a long time perhaps due to ageing. Thus, it is recommended to install new ones for the up-gradation and betterment of power plant life.

## REPAIR AND MAINTENANCE ACTIVITIES:

The following activities were accomplished during FY 2075/076:

### MECHANICAL MAINTENANCE:

- Repair, maintenance and cleaning of RKC engine air filters.
- Repair, maintenance and servicing of Elgi. air compressor no. 1.
- Replacement of flexible water connector elbow for engine no. 7.
- Replacement of air start valve of engine no. 4 (RKC).
- Repair & maintenance of cooling towers fan blade and motor housing of engine no. 3.
- Replacement of lube oil & fuel oil filters for all the engines.

- Scheduled and preventive maintenance activities were carried out thoroughly.



Fig: Repair and maintenance work of 300 kVA transformer

## ELECTRICAL MAINTENANCE:

- Repair, maintenance and servicing of 300 kVA station transformer.
- Replacement of 2 numbers of tubular poles at colony.
- Replacement of street CFL lights with LED vapour lights.
- Replacement of 100A main switch at pump house.
- Scheduled and preventive maintenance works were carried out thoroughly.



Fig: Repair And Maintenance Work Of Coolingtower's Fan Of English Electric Engine No.3

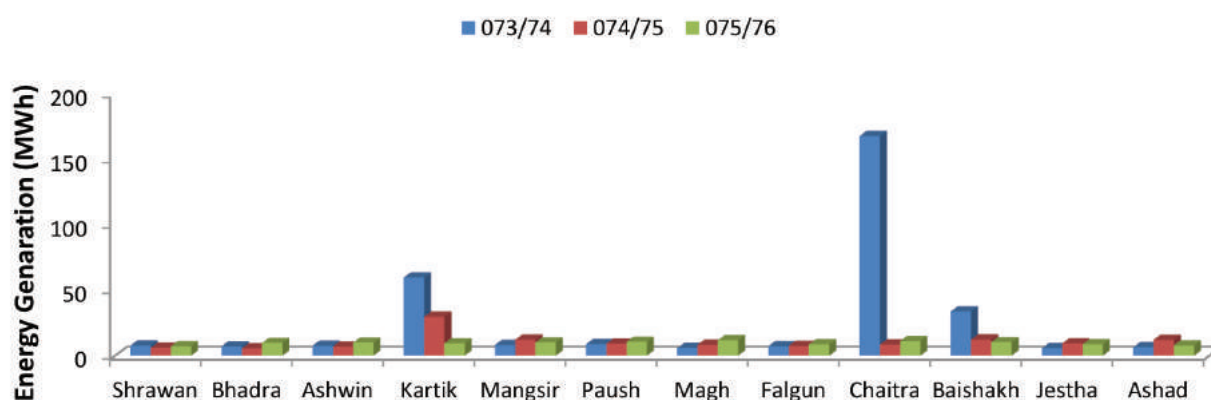




## SALIENT FEATURES OF HETAUDA DIESEL POWER PLANT

Type	Diesel fueled (Thermal)
Location	District Makwanpur, Hetauda W.N.-1
Installed capacity	14.41 MW
Average annual generation	922.24 MWh
Engine set	4Nos. of 2.5 MW 3Nos. of 1.47 MW
Fuel used	High Speed Diesel (HSD)
<b>Generator</b>	
Number	4Nos. of 3125 kVA 3Nos. of 1862.5 kVA
Rated voltage	11kV
Rated frequency	50Hz
Power factor	0.80
Rated speed	750 rpm
Excitation	AC exciter of 6.5V

## Monthly Energy Generation







## Hetauda Diesel Plant

Unit: MWh

FY/Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
043/44	-	-	-	8.62	-	-	-	-	18.70	1.30	-	-	28.62
044/45	86.10	-	-	-	-	-	-	-	-	-	-	12.80	98.90
045/46	-	-	-	628.80	1,142.50	1,818.90	2,009.30	1,810.90	607.40	-	423.90	274.50	8,716.20
046/47	-	19.40	42.20	-	41.20	-	-	-	27.90	-	-	-	130.70
047/48	88.30	33.70	72.80	-	-	7.30	-	0.20	-	-	-	-	202.30
048/49	-	-	-	-	4.50	927.70	1,944.50	2,321.20	2,387.30	2,392.30	893.40	131.80	11,002.70
049/50	-	87.50	248.50	575.50	1,529.10	2,071.40	1,492.60	1,366.40	1,696.80	1,094.90	432.70	537.10	11,132.50
050/51	248.80	344.20	426.50	200.90	742.30	1,590.90	820.80	473.80	-	-	-	-	4,848.20
051/52	-	-	-	-	-	-	-	146.40	806.00	571.80	1,020.80	1,331.00	3,876.00
052/53	841.40	512.30	769.30	1,000.60	714.90	1,028.00	996.10	619.30	523.30	279.80	119.90	281.60	7,686.50
053/54	503.00	511.20	259.20	300.60	451.40	476.80	389.80	881.30	1,287.60	1,039.40	1,536.30	1,729.70	9,366.30
054/55	1,519.20	1,732.50	1,800.30	922.60	1,178.80	1,311.60	1,888.10	2,050.00	1,974.90	1,106.20	1,266.30	1,931.30	18,681.80
055/56	316.10	415.38	689.02	1,033.10	1,606.50	3,186.20	3,516.20	3,544.64	2,989.20	2,386.90	3,056.30	1,464.10	24,203.64
056/57	382.40	389.85	293.70	539.90	985.25	1,141.75	1,452.30	2,119.35	1,610.89	1,715.90	317.05	117.30	11,065.64
057/58	8.50	63.10	78.10	27.30	246.55	282.55	294.00	363.55	1,871.70	1,159.00	478.90	323.80	5,197.05
058/59	234.50	348.40	209.50	252.30	435.10	526.65	512.50	386.20	134.50	5.40	-	-	3,045.05
059/60	1.55	2.95	1.10	6.25	66.90	1.00	1.80	82.85	69.15	11.40	22.80	1.55	269.30
060/61	10.30	59.70	43.75	69.95	1.45	186.85	301.05	63.90	266.00	91.05	25.35	-	1,119.35
061/62	-	9.40	-	-	-	188.34	349.15	202.77	158.09	424.12	774.40	86.55	2,192.82
062/63	284.05	396.30	167.00	69.35	372.95	667.69	418.58	491.28	401.41	181.70	57.92	12.53	3,520.76
063/64	60.63	288.78	291.15	248.21	363.47	467.22	454.48	-	55.17	270.67	278.72	242.67	3,021.17
064/65	82.85	341.69	122.95	89.70	55.96	42.90	329.94	21.57	116.14	43.14	20.33	41.55	1,308.72
065/66	25.98	146.90	343.47	127.16	138.30	522.92	605.43	1,058.08	181.83	45.80	131.48	407.02	3,734.37
066/67	28.43	220.39	439.00	443.84	511.16	396.45	224.29	369.01	346.39	61.85	63.87	312.18	3,416.85
067/68	332.70	96.12	87.62	155.06	122.28	145.12	163.72	23.85	88.54	79.80	25.91	12.26	1,332.97
068/69	-	-	-	-	2.46	89.21	223.33	223.20	37.99	-	41.70	-	617.89
069/70	3.46	7.31	2.40	104.53	178.21	2,150.86	2,731.10	2,053.26	1,196.89	431.56	6.83	2.21	8,868.62
070/71	2.20	1.93	0.51	88.63	52.30	16.07	917.86	2,612.70	1,005.10	57.00	6.04	8.58	4,768.92
071/72	5.33	4.68	-	81.05	-	-	1133.69	5.01	11.58	6.97	3.35	2.89	1,254.54
072/73	1.43	8.28	6.38	50.07	6.90	6.59	6.12	6.19	4.50	7.34	7.84	10.45	122.07
073/74	7.75	7.23	7.68	59.79	8.17	8.80	5.77	7.31	167.63	33.73	5.65	6.48	325.98
074/75	5.93	5.45	7.02	29.63	12.17	9.08	8.36	7.55	8.42	12.25	9.26	12.07	127.19
075/76	7.25	9.71	9.95	9.37	10.20	10.73	11.85	8.59	11.23	10.38	8.65	7.84	115.74
Till Date Generation, MWh													155,399.36

# SUNKOSHI HYDROPOWER STATION

## INTRODUCTION

Sunkoshi Hydropower Station (SHPS), located at 81 km east from Kathmandu, in Sindhupalchowk district, is a run-of-river daily pondage power station with an installed capacity of 10.05 MW and annual design generation of 70 GWh. This station has 3 units of 3.35 MW each. The powerhouse was commissioned in January 1972 with a friendly cooperation of the Water Conservancy and Electric Power Ministry of the People's Republic of China and Government of Nepal. Cost of the project was approximately NRs. 109.4 million including transmission line up to Kathmandu.

The cumulative generation of the station has reached 2378.431GWh in 2075/76 from the first run. It has generated 55.051 in FY 2074/75 and 62.151 GWh in FY 2075/76 with an increase of 12.9%.



Fig: Repairing of Shaft seal housing

## PRESENT STATUS

Presently, all the three units of the station are in normal operation. Recently, the Current Transformer (CT) of breaker of Unit No. 2 had caught on fire in powerhouse due to intrusion of cat on bus bar and the bush of bus bar was burst due to leakage of water in main bus bar of 6.3 KV. Damaged CT and post insulator of bus bar have been replaced and all three units are running in full load. The station has kept on with the regular preventive maintenance works thereby increasing the machine running hours and reducing the outage hours.

In rainy season, flushing of sand in forebay and desander basin and cleaning of trashrack chock have been carried out daily in order to prevent the erosion/abrasion in turbine units.

## REPAIR & MAINTENANCE ACTIVITIES

The following activities were performed during FY 2075/76.

### MECHANICAL MAINTENANCE

- Overhauling of unit no 3.
- Repair & maintenance of Shaft seal housing and Shaft seal plate of unit No. 1.
- Modification of trash rack of forebay.
- Maintenance of gallery gate no. 1 and 2 of forebay.
- Replacement of new gates of peak load pond.

## ELECTRICAL MAINTENANCE



Fig: Inspection of station transformer

- Modification of Excitation System of unit no. 1 by replacing with new Thyristor.
- Changing of CT and control wiring of unit no. 2.
- Changing of bushing and cable heads; and oil filtration of 6.3 MVA, 6.3/66kV transformer for evacuation of power after interruption of 66 kV transmission line.



Fig: Gabion wall construction

- Changing of post insulator on bus bar.
- Maintenance of breaker of 3 MVA, 6.3/33 kV transformer for evacuation of power after interruption of 33 kV transmission line.
- Modification of control panel of gallery gate and peak load pond.

## CIVIL MAINTENANCE

- River training works with gabion to protect store of SHPS.
- Construction of roof truss for water seepage control from roof of powerhouse.
- Powerhouse access road has been blacktopped.



Fig: Roof Truss built in Powerhouse



Fig: Blacktopped access road to Powerhouse

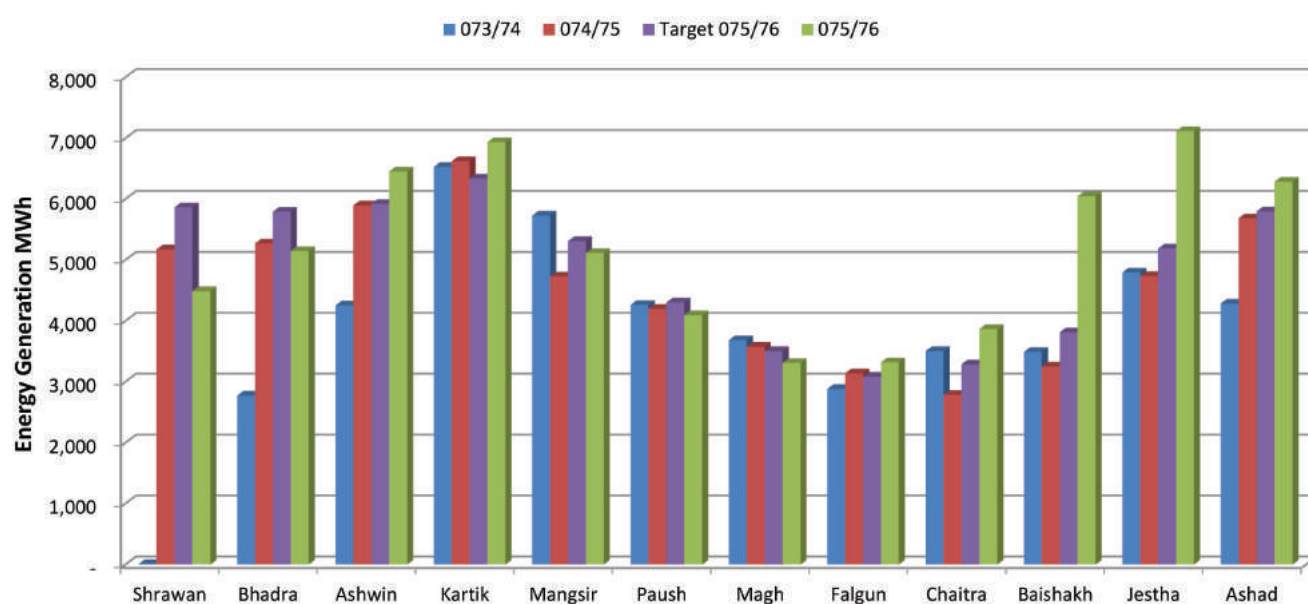




## SALIENT FEATURES OF SUNKOSHI HYDROPOWER STATION

1	Type:	Run-of-river
2	Installed Capacity:	10.05 MW
3	Designed head:	30.5 m
4	Design discharge:	39.9 m <sup>3</sup> /s
5	Length of canal:	2.653 km
6	Diameter of penstock:	2.4 m
7	Turbine generator set:	3
8	Shaft configuration:	Vertical
9	Turbine: Type: Output per unit: Speed:	Francis (Model: HL123a-LJ-140) 3530 kW 300 rpm
10	Generator: Type: Capacity: Rated Voltage: Rated Current: Rated Power Factor:	Synchronous, 3 phase (Model: TS 325/36-20) 3350 kW 6.3 kV 361 A 0.85
11	Project inception date:	End of 1968
12	Project placed in service:	January, 1972
13	Project financed by:	People's Republic of China and Government of Nepal
14	Project Cost:	NRs. 109.37 million (including transmission line)

## Monthly Energy Generation





## Sunkoshi Hydropower Station

Unit: MWh

FY	028/29	029/30	030/31	031/32	032/33	033/34	034/35	035/36	036/37	037/38	038/39	039/40	040/41
Generation	3,416.19	31,968.48	35,429.50	33,714.75	31,200.93	33,267.94	49,056.78	54,250.26	55,595.84	57,778.03	52,817.74	59,133.60	49,291.68
FY/Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
041/42													42,816.96
042/43	5,729.38	5,208.96	6,385.44	6,718.46	5,788.80	4,503.84	3,343.20	3,063.84	3,093.12	3,990.72	4,991.04	4,591.68	57,408.48
043/44	4,802.40	4,178.40	5,940.48	4,809.12	4,607.52	4,152.96	3,003.36	2,534.40	3,288.00	3,272.16	2,865.12	1,529.76	44,983.68
044/45													11,639.52
045/46	2,858.88	3,874.52	3,535.20	4,270.08	4,057.44	4,196.16	4,058.88	3,545.28	4,022.88	4,654.12	4,733.76	4,770.72	48,577.92
046/47	4,269.12	4,410.24	4,446.24	5,513.28	4,380.00	3,034.56	2,960.16	3,038.40	3,255.36	3,376.32	774.24	2,503.68	41,961.60
047/48	4,549.92	4,441.44	5,308.80	5,692.32	3,965.28	3,191.04	3,041.28	2,767.20	3,015.84	3,636.96	4,212.96	4,243.68	48,066.72
048/49	4,445.28	5,049.12	6,165.12	5,892.96	4,094.40	3,682.08	3,012.00	2,767.68	2,849.28	3,044.16	3,983.04	4,613.28	49,598.40
049/50	4,516.80	4,745.28	4,573.92	4,875.84	5,106.24	3,861.12	3,072.96	2,664.00	2,693.76	4,491.84	5,375.04	6,446.88	52,423.68
050/51	6,000.00	6,650.40	6,679.68	6,441.12	5,185.92	3,627.84	3,196.80	2,797.92	1,920.96	3,528.96	6,100.32	6,456.96	58,586.88
051/52	6,968.64	6,914.40	7,080.00	6,479.04	4,602.24	3,505.92	2,984.64	2,855.52	3,367.68	4,591.20	6,115.24	6,085.48	61,550.00
052/53	6,141.60	6,484.80	6,975.36	6,516.96	5,258.40	4,247.04	3,644.64	3,468.00	3,728.16	4,785.60	5,902.56	5,846.88	63,000.00
053/54	5,525.76	5,726.40	5,776.80	6,566.88	5,496.00	4,080.48	3,200.64	2,961.60	2,952.96	2,892.96	4,983.84	5,398.08	55,562.40
054/55	3,967.20	5,180.64	6,457.92	6,340.80	5,385.12	4,097.28	3,102.24	3,040.32	3,804.96	5,533.44	6,466.20	5,989.92	59,366.04
055/56	5,430.24	6,509.76	6,383.52	6,591.84	5,055.36	3,977.76	3,362.88	2,972.16	2,900.16	3,418.56	1,438.56	6,711.36	54,752.16
056/57	6,804.96	7,261.92	7,057.44	6,986.40	6,209.28	4,695.84	3,362.88	3,036.00	3,374.88	4,134.72	6,459.84	6,804.00	66,188.16
057/58	6,442.08	5,617.44	5,773.44	5,976.00	5,158.08	3,974.88	3,149.28	2,833.92	2,783.52	3,471.36	4,239.84	4,861.44	54,281.28
058/59	5,542.56	4,260.00	5,604.96	5,013.12	4,890.24	3,785.76	3,280.32	2,733.60	3,024.96	3,868.32	4,088.16	4,728.48	50,820.48
059/60	5,343.84	5,426.88	5,999.52	5,411.52	940.80	3,651.36	3,109.44	3,098.88	3,454.08	4,291.68	6,051.36	6,015.84	52,795.20
060/61	5,537.28	4,536.96	4,199.52	5,566.56	4,980.48	3,947.52	3,168.96	2,822.40	2,729.76	3,359.04	4,783.68	4,549.44	50,181.60
061/62	5,595.84	5,120.16	5,423.52	4,398.24	4,736.16	4,049.32	3,436.59	3,254.59	3,461.83	4,129.48	5,744.83	884.21	50,234.77
062/63	4,739.47	4,502.41	4,357.76	3,863.95	4,593.01	3,879.40	3,354.79	2,924.04	3,378.33	4,419.53	5,878.11	5,437.85	51,328.66
063/64	5,467.43	4,559.52	5,412.63	5,577.42	5,410.49	4,187.63	3,524.46	3,486.95	4,169.47	3,873.49	5,560.20	5,374.30	56,603.99
064/65	5,365.10	5,570.70	5,453.20	4,710.40	4,835.20	4,032.60	3,370.00	3,070.70	2,774.80	3,264.80	5,100.60	5,536.20	53,084.30
065/66	6,402.80	6,161.80	6,683.80	6,952.50	5,477.70	3,967.50	3,183.00	2,721.30	2,983.60	3,673.80	5,702.70	6,683.10	60,593.60
066/67	6,695.60	6,815.40	6,779.60	6,514.60	5,230.90	3,761.20	2,957.00	2,588.30	2,805.10	2,983.80	4,284.70	5,969.20	57,385.40
067/68	6,500.80	6,400.60	6,902.10	6,819.60	5,480.90	3,789.60	3,163.00	2,888.70	2,776.60	3,433.60	5,314.20	6,885.70	60,355.40
068/69	7,213.60	6,965.40	7,160.60	7,348.80	5,852.60	4,391.40	3,224.40	3,298.10	3,700.50	3,744.80	6,335.10	7,147.80	66,383.10
069/70	7,131.40	7,194.40	7,152.20	7,063.20	5,115.50	3,636.90	3,148.30	3,211.50	3,328.20	4,466.80	6,632.20	5,496.40	63,577.00
070/71	7,049.40	6,752.30	6,663.40	6,473.10	6,308.90	4,626.50	3,513.00	3,116.90	3,346.50	3,884.60	6,175.60	6,757.20	64,667.40
071/72	3,197.90	473.10	-	-	3,179.80	4,326.60	3,215.90	3,272.80	3,740.00	1,608.00	-	-	23,014.10
072/73	2,356.10	1,553.80	2,186.90	4,766.70	4,712.10	4,272.60	3,629.70	3,185.30	2,979.90	2,854.00	1,958.80	1,538.30	35,994.20
073/74	8.60	2,772.20	4,252.70	6,527.20	5,728.10	4,261.20	3,684.50	2,881.40	3,503.90	3,492.90	4,794.10	4,283.90	46,190.70
074/75	5,174.90	5,271.40	5,895.00	6,618.70	4,728.80	4,197.90	3,574.40	3,137.20	2,783.20	3,248.10	4,736.30	5,684.60	55,050.50
075/76	4,488.20	5,146.30	6,450.80	6,934.40	5,114.40	4,093.70	3,305.50	3,316.70	3,864.90	6,044.20	7,114.30	6,283.30	62,156.70
Till Date Generation, MWh													2,378,102.70



# ILAM (PUWAKHOLA) HYDROPOWER STATION

## INTRODUCTION:

Puwakhola hydropower station, run-off river type plant, located at Golakharka, Ilam having installed capacity of 6.2 MW and annual design generation of 48 GWh was commissioned in 1999 AD. It was jointly commissioned and constructed with the in-house management of the Nepal Electricity Authority and the source of fund was the Government of Nepal and Nepal Electricity Authority, the total cost of which was US\$15.7million dollars.

It is the only sizeable hydel plant NEA has in the Eastern part of Nepal. It has two identical units of 3.1 MW each and has generated 34.19 GWh of energy this fiscal year, and till date cumulative generation of the plant had reached 589.82 GWh.

## PRESENT STATUS:

The geology of the area lying across the penstock alignment from Anchor Block 3 to 5 is still fragile causing the anchor blocks to shrink and resulting penstock pipes to buckle and bend. Currently, both units of this power plant are in operation but due to operational problem in control and protection system and electro-mechanical components IHPS is facing trouble in smooth operation of machines. Thus, the upgradation work of control & protection systems along with related electro-mechanical components replacement works are in the last phase of completion till end of F/Y 2075/076 and planning to complete the Installation & commissioning work of such up gradation work by the end of 2076 BS.

## REPAIR AND MAINTENANCE ACTIVITIES:

Major Repair and maintenance activities that have been carried out on FY 2075/76 are:

### MECHANICAL MAINTENANCE:

- Replacement of Cup Seals of Opening/Closing Device and Nozzle-Needle.
- Seal replacement of Main gate, Flushing Gates at Intake and head tank.
- Epoxy Painting on Outer Surface of Remaining Section of Penstock Pipe which was not completed in last Fiscal Year.
- Overhauling of Unit No. II.
  - Replacement of major turbine parts such as Turbine runner, Needles, Nozzles etc.
  - Welding of worn-out surface of Upper and Lower Deflectors.
  - Replacing water dispatcher to reduce abnormal noise and vibration of turbine casing of both Units.
- Applying Metallic Ceramic Painting (UPS 210) on inner surface of Turbine Casing and Needle-Nozzle Assembly.





Fig: Dismantling of existing Runner using Torque Wrench



Fig: Testing of Power Transformer

### ELECTRICAL MAINTENANCE:

- Replacement of 33 kV Outdoor SF6 Breaker with VCB.
- Replacement of 33 kV Outdoor CT.
- Installation & Testing of 110 V DC Battery Bank.
- Testing of Power & Station Transformer and filtration/ replacement of Power Transformer Oil.
- Varnishing the Jumper of Stator Coil & Meggering of Unit No. II Generator.

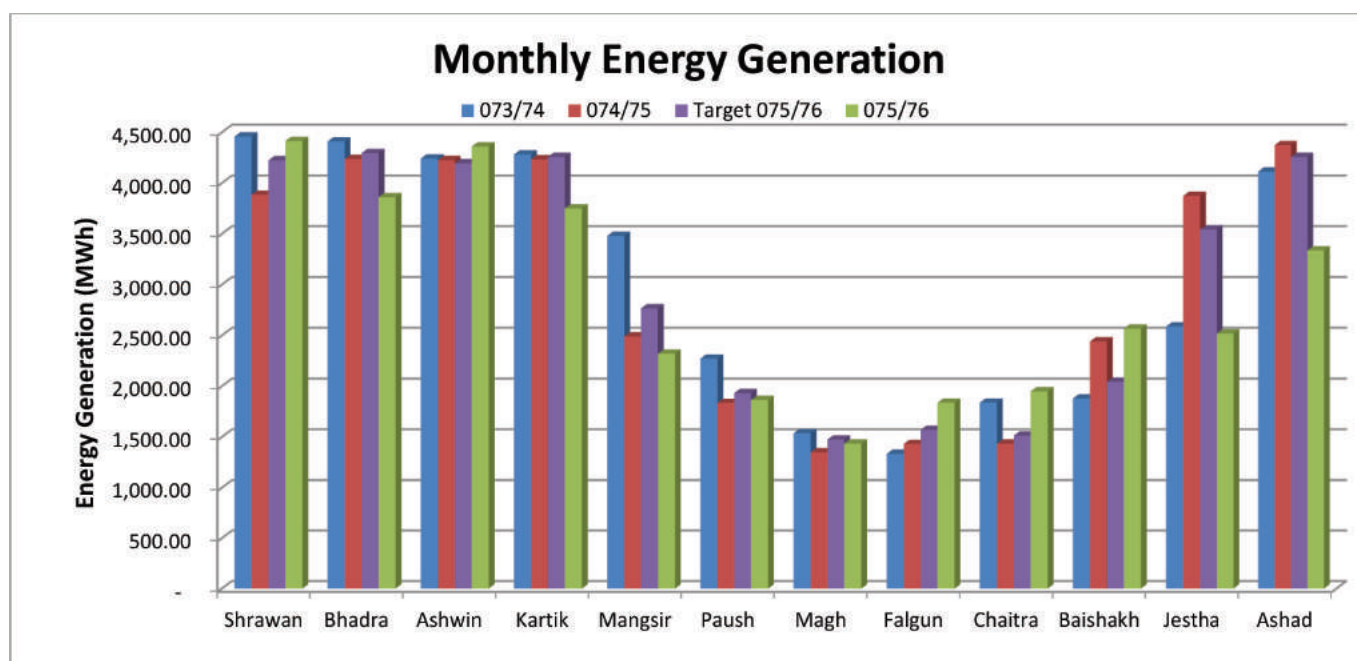
### CIVIL MAINTENANCE:

- Supervision in construction of Type "C" Staff Quarter.
- Maintenance of Quarters at office premises.
- Maintenance of drinking water supply system for Office, Quarter and Power House.
- Bush Cutting works along slab lining across penstock alignment.



## SALIENT FEATURES OF PUWAKHOLA HPS

Type	Run- of- river
Location	Ilam
Installed capacity	6.2 MW
Annual average energy	48 GWh
Maximum Net head	304 m
Catchment area	125.1 km <sup>2</sup>
Average annual flow	2.5 m <sup>3</sup> /s
Live storage volume	2057m <sup>3</sup>
Dam	Diversion weir type, 30.4m crest length
Total length of the waterways	192 m
Penstock	1 No., 1001m long, Dia 1.10-0.60m, steel pipe
<b>Turbine</b>	
Number and Type	2, Horizontal Pelton
Rated discharge	1.25 m <sup>3</sup> /s
Rated output	3.3 MW
Rated speed	600 rpm
<b>Generator</b>	
Rated output	3.7 MVA
Rated voltage	6.6 kV
Rated frequency	50 Hz
Power factor	0.85
Power transformer	8 MVA, 6.6/33 kV, 3 phase, 1 No.
Transmission line	33 kV about 0.4 km, single circuit





Ilam (Puwakhola) Hydropower Station												Unir: MWh	
FY/Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
056/57									421.73	1,847.65	2,367.41	2,478.72	7,115.51
057/58	2,628.29	2,518.90	2,035.06	2,077.97	2,146.08	1,890.38	1,166.98	1,548.59	965.22	1,160.06	1,735.15	1,424.37	21,297.04
058/59	1,971.70	2,325.70	2,844.05	2,809.31	2,476.13	2,173.29	1,875.70	1,404.58	1,494.05	1,743.87	1,831.92	1,208.30	24,158.58
059/60	2,075.86	2,696.64	2,952.38	3,343.01	2,845.97	2,102.69	1,753.10	1,927.78	2,046.14	1,325.95	1,767.62	1,328.06	26,165.20
060/61	3,007.44	3,095.28	2,665.54	3,540.96	3,421.92	2,470.51	2,117.23	1,677.07	1,627.61	1,640.60	3,350.45	2,741.82	31,356.43
061/62	3,316.80	3,187.59	3,338.33	3,660.24	3,247.06	1,464.05	1,851.84	1,382.30	1,711.73	1,785.31	1,392.48	3,040.13	29,377.86
062/63	3,676.80	3,741.26	4,164.24	3,558.61	2,431.33	1,572.97	1,327.99	1,169.05	1,058.28	1,507.48	2,385.29	2,337.56	28,930.86
063/64	2,011.76	2,074.18	3,098.59	3,904.87	3,105.39	2,081.66	1,672.91	2,702.60	1,853.35	2,503.26	3,416.93	4,047.99	32,473.49
064/65	3,374.65	3,972.89	3,614.03	3,895.59	3,341.40	2,215.96	2,018.26	1,828.18	1,601.96	1,573.84	3,559.66	3,644.51	34,640.93
065/66	4,335.25	3,881.78	3,865.54	4,111.40	2,727.56	2,070.11	1,572.28	1,188.46	1,353.81	1,242.44	1,888.35	3,446.00	31,682.98
066/67	3,672.97	3,526.06	3,821.13	3,930.76	3,002.19	2,047.17	1,373.22	1,030.71	915.80	1,423.78	1,547.19	3,767.11	30,058.07
067/68	3,757.73	3,794.36	3,629.72	3,910.51	2,759.77	1,877.91	1,480.84	1,021.18	1,374.88	2,212.69	2,700.74	3,027.51	31,547.81
068/69	3,205.89	3,743.02	3,846.84	4,197.49	2,916.64	1,839.38	1,239.85	1,019.31	1,182.94	1,163.55	1,240.52	2,734.57	28,329.99
069/70	4,341.68	3,228.63	3,888.38	3,783.06	2,312.64	1,553.41	999.86	982.50	714.60	1,800.95	3,058.73	3,771.23	30,435.66
070/71	4,083.24	3,842.97	3,546.31	4,015.62	2,737.98	2,009.65	1,101.53	1,034.47	1,069.57	728.42	1,529.81	3,905.38	29,604.95
071/72	3,917.26	4,125.36	4,118.42	4,024.15	2,686.56	1,904.93	1,400.69	1,500.07	1,385.93	2,264.91	2,089.57	2,994.43	32,412.28
072/73	4,094.75	3,987.15	4,185.59	4,309.62	2,815.36	2,023.88	1,673.54	1,400.60	1,299.97	1,183.59	2,711.56	4,145.91	33,831.51
073/74	4,457.24	4,408.80	4,239.61	4,279.92	3,478.20	2,269.38	1,535.49	1,331.75	1,836.17	1,877.65	2,587.23	4,112.81	36,414.24
074/75	3,883.74	4,234.64	4,224.08	4,231.79	2,488.99	1,833.45	1,347.65	1,430.18	1,432.73	2,440.20	3,871.75	4,371.35	35,790.53
075/76	4,412.66	3,859.84	4,357.75	3,747.97	2,317.63	1,862.38	1,433.26	1,834.42	1,948.12	2,565.89	2,517.80	3,335.09	34,192.81
Till Date Generation, MWh													5,89,816.79

# CHATARA HYDROPOWER STATION

## INTRODUCTION:

Chatara Hydropower Station, a canal drop type hydropower station, is located at Chatara, Sunsari with an installed capacity of 3.2 MW (2 units, each of capacity 1.6 MW) and annual design generation of 6 GWh. It was commissioned in 1996 AD with the assistance from Government of India at a cost of NRs. 162.6 million. The plant which was originally designed to be a captive plant for powering drazer pumps to flush sediments from the Canal was later handed over to NEA by Sunsari Morang Irrigation Project (SMIP) on 29th March, 1999.

## PRESENT STATUS:

After five years of complete plant shutdown, a single unit (Unit No. 2) started generating from the month of October 2018. The hydropower station has generated 2,698.25 MWh of energy meeting the energy declaration/target of 2,600 MWh in last 9 months of FY 2075/76. Since it is mainly an irrigation scheme, the hydropower station cannot be operated in full load throughout the year. Water released after power generation is used for the irrigation in Sunsari and Morang districts. Farmers do not require water throughout the year therefore during the crop harvesting time and canal maintenance time period, the hydropower station has to stop generation

The hydropower station has planned for the overhauling of Unit no. 1 this year. For this, its open competitive bidding procedures has been started.



Fig: Machine Hall Unit No. 2

## REPAIR AND MAINTENANCE ACTIVITIES:

The following activities were performed during F/Y 2075/76.

### MECHANICAL MAINTENANCE:

- Troubleshooting of pinion shaft assembly problem.



Fig: Troubleshooting of Pinion Shaft Assembly Problem





- Upgradation of 10 ton chain hoist by newly supplied 12 ton wire rope electric hoist.
- Changing of J-seal & flat seals of the stop log gates in upstream & downstream.
- Iron grit blasting and epoxy painting of the stop log gates.



Fig: Newly Supplied 12 Ton Electric Hoist

## ELECTRICAL MAINTENANCE:

- Cleaning, Varnishing and electrical testing of the alternator of unit no. 2 before starting generation.
- Commissioning of Unit no. 2.
- Cutting of bush & side clearance and disc pin, channels changing work of both 33 kV Line and 11 kV line.
- Other electrical maintenance, relay testing, meggering and inspection are also done.

- Procurement of 3.5 MVA, 33/11 kV Power transformer is on the process.



Fig: Electrical testing of an alternator of Unit 2

## CIVIL MAINTENANCE WORKS:

- Painting of all power house civil structures.
- Regular maintenance of Quarter, guest house and office building.



Fig: Upstream of Power House

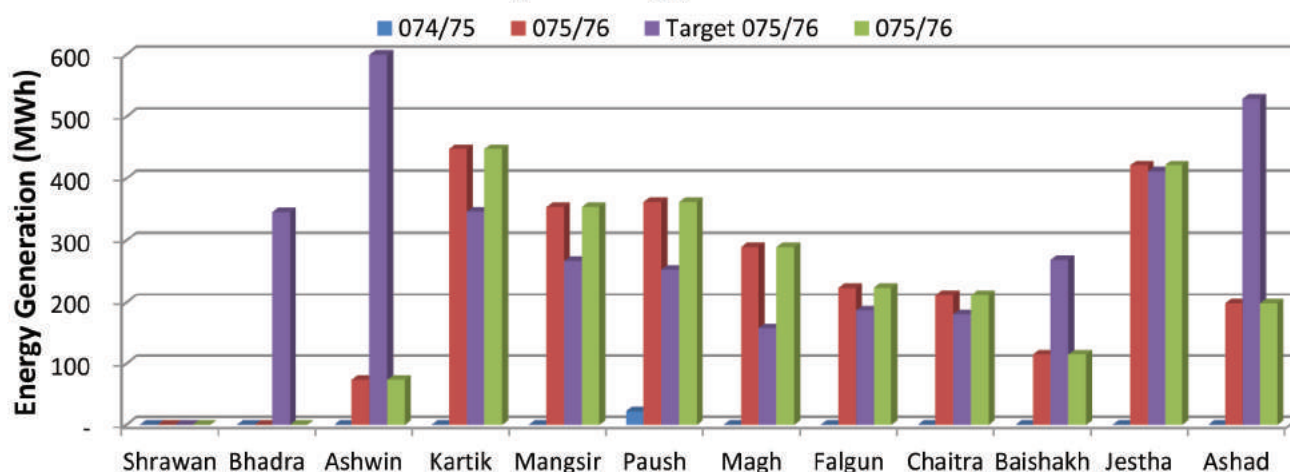
- Protection of buildings and civil structures.



## SALIENT FEATURES OF CHATARA HYDROPOWER STATION

Type	Canal drop
Location	Chatara, Sunsari
Installed Capacity	3.2 MW
Annual Average energy	6 GWh
Maximum Net Head	5.38 M
Turbine	
Number	2 Nos.
Type	Kaplan (Bevel Gear Bulb Turbine)
Rated Speed	165 rpm
Generator	
Type	Synchronous Generator
Rated Output	1627 kW
Rated Voltage	11 kV
Rated Frequency	50 Hz
Rated Speed	750 rpm
Power Transformer	3500 kVA, 11/33 kV
Transmission Line	33 kV, 14 km

## Monthly Energy Generation





## Chatara Hydropower Station

Unit: MWh

FY/Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
052/53												23.00	
053/54	143.25	121.75	190.50	75.50	170.50	202.00	132.50	209.75	-	-	121.50	63.75	1,431.00
054/55	98.75	46.00	62.75	33.50	44.25	30.75	11.50	-	-	1.25	42.50	119.50	490.75
055/56	113.25	109.50	33.00	-	-	-	-	-	47.00	283.75	310.25	290.75	1,187.50
056/57	352.50	509.25	672.50	377.50	362.50	183.00	301.00	213.00	191.75	138.75	313.00	638.25	4,253.00
057/58	468.00	675.75	565.50	322.00	38.50	226.25	92.75	237.00	129.50	131.50	594.00	446.00	3,926.75
058/59	125.00	23.75	60.50	-	-	-	-	-	-	-	-	-	209.25
059/60	-	-	-	-	-	-	-	-	-	17.75	428.50	532.25	978.50
060/61	683.50	666.50	602.25	317.50	247.75	285.25	173.75	3.75	123.25	327.00	429.75	644.00	4,504.25
061/62	746.00	590.50	458.25	457.00	182.50	112.75	213.00	92.00	108.75	-	420.25	734.00	4,115.00
062/63	1,008.00	933.50	621.75	310.75	303.00	106.75	Not run	Not run	35.25	69.75	554.00	620.50	4,563.25
063/64	707.25	759.00	765.75	435.75	341.00	239.75	8.00	285.75	299.50	338.25	479.25	560.50	5,219.75
064/65	462.75	673.75	659.25	287.75	78.25	284.25	163.50	110.25	168.25	292.25	370.00	289.00	3,839.25
065/66	609.25	383.75	110.50	113.25	113.25	91.75	181.00	133.00	109.00	138.25	376.25	279.00	2,638.25
066/67	163.00	213.50	396.25	197.25	172.25	100.50	49.25	27.50	79.00	172.00	349.25	504.75	2,424.50
067/68	653.25	666.25	522.75	317.25	265.00	260.75	70.75	167.00	99.75	227.75	357.50	489.75	4,097.75
068/69	804.25	460.75	612.75	364.25	195.00	39.75	-	28.75	187.25	146.75	193.25	-	3,032.75
069/70	-	-	-	-	11.25	125.00	133.00	143.25	124.00	269.50	340.75	497.00	1,643.75
070/71	727.00	492.50	486.25	108.50	-	132.00	166.00	90.00	133.50	16.75	-	2.75	2,355.25
071/72	51.00	2.25	-	-	-	-	-	-	-	-	-	-	53.25
072/73	-	-	-	-	-	-	-	-	-	-	-	-	-
073/74	-	-	-	-	-	-	-	-	-	-	-	-	-
074/75	-	-	-	-	-	22.25	-	-	-	-	-	-	22.25
075/76	-	-	73.75	447.75	354.25	362.25	289.50	223.50	212.00	115.25	421.25	198.75	2,698.25
Till Date Generation, MWh													53,707.25

# PANAUTI HYDROPOWER STATION

## INTRODUCTION:

Panauti Hydropower Station is third oldest Hydropower Station of Nepal. It is a run of river scheme hydropower plant with intake on right bank of Roshi Khola and Power House located at Khopasi, Kavre, nearly 35 km east of Kathmandu.

The plant has installed capacity of 2.4 MW and annual design generation of 6.97 GWh. It was commissioned on 1965 A.D., developed jointly by Soviet Union Government and GON at a cost of NRs. 27 million.

The station was developed with joint purpose of hydropower generation and irrigation. However, the water in the canal has also been used for drinking purposes as well.

The cumulative generation of the station has reached 135.180GWh till F.Y.2075/76 from its first run. The station has generated 1.112GWh in FY 2074/75 and 3.006 GWh in FY 2075/76.

## PRESENT STATUS:

The water users along the canal are having the same irrigation facilities as earlier days. Recently the power station control, monitoring and protection system is upgraded through new State-of-Art SCADA system

## REPAIR AND MAINTENANCE ACTIVITIES:

The following activities were accomplished during FY2075/76.

## ELECTROMECHANICAL MAINTENANCE:

- Rehabilitation and Modernization of Switchyards of Panauti Hydropower Station located at Khopasi and Bhakatpur.
- Installation and Commissioning of EOT Crane's Hoisting and Radio Remote Control System of Power House



Fig: Installation and testing of VCB.



Fig: Installation Works for Switchyard's Equipment at Panauti Hydro Power Station.





- Repair & maintenance of Francis Runner and its components of unit 2.
- Repair & maintenance of Forebay and Flushing Gates.
- Replacing Bushing, Copper Studs, OTI and complete Oil of Power Transformers of Power House.
- Upgrading distribution lines of Office and Colony Areas.

## CIVIL MAINTENANCE:

- Cleaning works for Regulating Reservoir.
- Repair and maintenance of headrace canal.
- Repair, maintenance and restoration works for colony buildings.
- Painting Works for all Roofs of Office building and Colony.
- Construction of barbed boundary around Forebay.



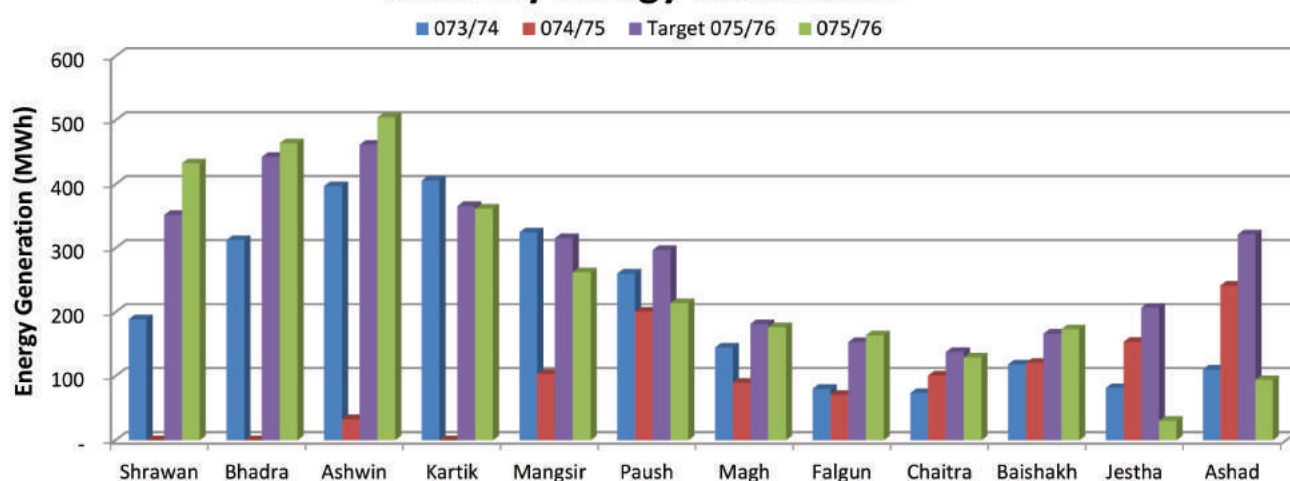
Fig: Deposited Debris and Mud Cleaning of Regulating Reservoir



## SALIENT FEATURES OF PANAUTI HPS

Type	Run of River
Location	Panauti Municipality – 10, Khopasi
Installed capacity	2.4 MW
Designed annual energy	6.97 GWh
Maximum gross head / Net head	66m /60m
Waterways	
Total length of the Canal	3.721 km
Discharge Capacity of Canal	3.2 m <sup>3</sup> /s
Live storage volume of Regulating Reservoir	50,000 m <sup>3</sup>
Penstock	1 No., 370m long, Dia 1.4m
Turbine	3, Horizontal Francis
Number and Type	1.61 m <sup>3</sup> /s
Rated discharge	0.85 MW
Rated output	1000 rpm
Rated speed	
Generator	1000 kVA
Rated output	6.3 kV
Rated voltage	50 Hz
Rated frequency	0.80
Power factor	
Power transformer	1550 kVA* 2Nos., 6.3 kV/33 kV, 3 phase,
Transmission line	33 kV, 20 km, single circuit

## Monthly Energy Generation





## Panauti Hydro Power Station

Unit: MWh

FY	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38	2038/39	2039/40	2040/41	2041/42	2042/43	2043/44	2044/45
Generation	3,895.10	2,848.58	3,062.96	3,338.75	3,721.35	4,599.00	4,484.16	3,827.00	4,539.06	3,838.34	3,360.34	3,249.72	3,964.50
FY	2045/46	2046/47	2047/48	2048/49	2049/50	2050/51	2051/52	2052/53	2053/54	2054/55	2055/56	2056/57	2057/58
Generation	3,782.70	2,721.89	2,371.86	2,501.11	2,600.02	3,123.53	4,007.52	3,727.08	4,349.16	3,559.38	1,976.41	2,437.92	3,891.24
FY/Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
058/59	427.32	581.76	683.10	590.04	428.04	331.02	275.22	206.82	196.38	225.54	306.72	402.84	4,654.80
059/60	550.80	330.66	-	-	-	-	-	-	-	-	81.18	458.82	1,421.46
060/61	594.90	567.36	442.44	426.96	416.16	355.32	253.26	163.80	123.48	156.78	203.04	98.10	3,801.60
061/62	555.66	607.86	611.64	463.86	358.38	281.16	218.52	118.80	121.68	127.98	56.88	162.00	3,684.42
062/63	437.22	512.64	473.04	430.74	300.42	195.66	96.30	81.90	77.04	194.58	236.16	39.24	3,074.94
063/64	394.38	539.28	529.56	280.98	309.60	194.76	147.96	187.02	50.76	-	29.28	234.97	2,898.55
064/65	281.16	272.88	359.40	390.42	318.42	311.76	205.20	186.30	135.72	143.64	175.50	297.54	3,077.94
065/66	336.60	236.70	234.72	237.24	255.78	209.70	95.94	64.98	78.48	86.18	37.76	5.47	1,879.55
066/67	399.92	643.81	538.70	373.72	277.65	193.46	72.92	103.92	35.66	101.07	18.77	119.72	2,879.31
067/68	369.85	557.42	609.79	238.54	258.74	230.84	107.18	146.39	68.56	141.91	-	-	2,729.22
068/69	-	-	152.64	262.80	249.30	281.34	111.78	-	-	43.74	30.78	147.78	1,280.16
069/70	266.76	242.82	65.52	126.18	40.65	151.85	93.43	93.48	10.65	98.54	86.17	234.77	1,510.81
070/71	254.80	312.12	283.29	316.75	306.40	245.46	113.47	122.30	71.08	70.21	27.55	83.09	2,206.52
071/72	180.40	134.47	175.53	129.34	162.65	121.26	55.22	151.97	93.22	113.28	125.81	189.24	1,632.38
072/73	237.51	353.26	339.21	293.67	269.45	204.17	120.76	71.85	25.58	8.71	66.45	61.97	2,052.59
073/74	188.823	312.55	399.35	405.94	324.72	260.02	144.60	79.82	73.21	118.13	81.20	110.20	2,498.56
074/75	-	0.00	32.52	0.00	103.33	200.81	89.59	70.49	100.63	120.37	153.45	241.26	1,112.44
075/76	432.49	464.03	504.66	361.89	262.05	214.08	176.54	163.79	129.06	173.17	30.21	93.91	3,005.86
Till Date Generation, MWh													135,179.80



# SETI HYDROPOWER STATION

## INTRODUCTION:

Seti Hydropower Station is a run of river type power plant with installed capacity of 1.5 MW and design generation of 9.8 GWh consisting of 3 units each 0.5 MW. It is located at Nadipur, Pokhara and was commissioned in 1985 AD with assistance from Government of People's Republic of China and Government of Nepal. The power canal for this power station is jointly used for irrigation purposes looked after by Department of Irrigation and hence, the operation of this power station is affected by irrigation as well.



Fig: Seti Hydropower Station

The cumulative generation of Seti HPS has reached 325.66 GWh till 2075/76 from its first run. The station has generated 10.03 GWh in FY 2075/76.

## PRESENT STATUS:

Presently, all three units are in normal operation and the station has the ability to operate at its full capacity round the year. The maintenance of wear at headworks has been completed which helps in continued operation of this station throughout the year. However, major repair and maintenance works are required in headworks area in the near future.

In this FY 2075/76 AMR/AMI system has installed in 4 CT operated energy meters for automatic remote meter reading system.



Fig: Overview of damaged headworks



Fig: Headworks after repair of wear





## REPAIR AND MAINTENANCE ACTIVITIES:

### MECHANICAL WORKS:

- Overhauling of unit no. 3 and Maintenance of governor and high pressure oil system.



Fig: Overhauling of Unit No. 3



Fig: Governor maintenance of Unit No. 3



Fig: Guide bearing replacement work of unit no. 1

- Repair of governor oil pressure unit in Unit No. 3
- Replacement of the guide bearing and slip ring of unit no. 1.
- Repair of big desander gate and stop log gate at Jaubari
- Replacement of steel rope, rubber seal and steel plate lining works at Jaubari radial gate.

### ELECTRICAL WORKS:

- Inspection of generator stator, rotor and checking of insulation and protective gear.
- 11kV VCB maintenance work.
- AMR/AMI system has installed in 4 energy meters.
- Relay testing, meggering and inspection.
- Rewinding of step-up transformer No. 2
- Oil filtration and insulation improvement in transformers.
- Replacement of 11kV XLPE cable with cable termination.



Fig: Transformer and LA checking



## CIVIL MAINTENANCE WORKS:

- Construction of weir section of head works which was damaged by flood.
- Relocating desander basin flushing gate to original position.
- Cleaning, painting civil maintenance works.

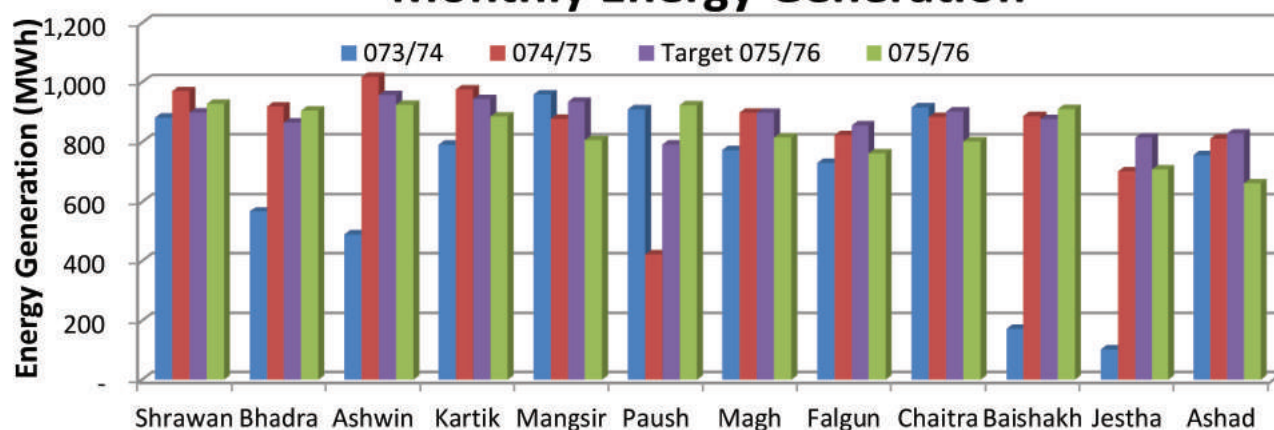
## ONGOING WORKS

The ongoing modification and renovation works of control system and replacement of existing governor with digital governor and SCADA embedded control panel will be completed in year 2019.

### SALIENT FEATURES OF SETI HPS

Type	Run of River
Location	Nadipur, Pokhara
Installed capacity	1.5 MW
Annual average energy	9.8 GWh
Maximum Net head	22.5 m
Total length of the waterways	7.7 km
Penstock	1 No., 90m long, Dia 2.4m, steel lined
Turbine	3, Horizontal Francis
Number and Type	2.96 m <sup>3</sup> /s
Rated discharge	543 kW
Rated output	500 rpm
Rated speed	
Generator	500 kW
Rated output	6.3 kV
Rated voltage	50 Hz
Rated frequency	0.80
Power factor	
Power transformer	650 kVA, 6.3/11 kV, 3 Nos.
Transmission line	11 kV

## Monthly Energy Generation





## Energy generation data of SETI HPS

Seti Hydropower Station

Unit: MWh

Year	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052		
Generation	2160.54	7940.34	9479.16	9285.48	10017.09	8503.29	8572.59	9825.39	10799.1	10903.59	10533.52		
FY/Month	Shrawan	Bhadra	Asoj	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jesth	Asar	Total
053/54	786.59	819.69	899.54	921.16	949.25	927.82	968.11	903.40	914.64	905.21	924.37	635.77	10,555.55
054/55	759.42	784.23	874.04	786.17	664.25	700.21	814.81	450.46	274.33	609.84	658.71	610.79	7,987.26
055/56	745.38	640.53	747.81	921.69	868.32	893.97	841.77	693.99	687.17	699.75	794.60	770.93	9,305.91
056/57	786.87	809.07	811.44	877.68	819.39	831.28	715.63	650.61	686.56	875.45	821.77	660.96	9,346.71
057/58	800.28	807.33	814.47	927.54	902.43	752.22	600.93	772.37	670.83	663.93	788.76	804.52	9,305.61
058/59	732.33	857.50	721.53	708.03	770.67	685.89	525.06	477.45	647.28	728.10	639.99	543.87	8,037.70
059/60	681.48	783.81	869.22	910.80	875.79	824.76	693.27	793.08	833.22	612.90	686.25	635.13	9,199.71
060/61	690.84	746.64	714.78	848.34	761.04	582.03	557.37	518.31	648.37	861.48	884.88	766.08	8,580.16
061/62	751.23	809.55	826.11	888.93	827.82	726.48	820.44	735.48	679.95	650.79	793.44	642.24	9,152.46
062/63	703.17	698.67	940.86	913.41	933.93	898.56	880.29	457.11	808.47	866.52	731.43	826.83	9,659.25
063/64	931.77	963.18	920.07	940.41	913.14	965.70	891.27	916.56	909.90	692.91	782.19	877.68	10,704.78
064/65	798.57	700.56	932.58	916.29	918.90	995.94	940.23	976.23	1,008.45	1,032.84	1,035.99	566.19	10,822.77
065/66	918.45	854.64	888.03	999.09	967.59	920.25	955.26	740.07	902.34	852.93	921.87	949.59	10,870.11
066/67	757.35	767.81	1,076.49	1,045.35	1,088.10	1,070.46	1,011.15	931.86	1,012.50	1,033.83	487.80	915.03	11,197.73
067/68	957.87	940.12	1,012.59	1,016.91	887.85	1,040.58	871.20	917.10	1,022.85	1,012.77	999.36	936.99	11,616.19
068/69	906.03	903.60	603.99	998.64	989.55	1,016.91	974.70	953.46	987.57	737.73	747.18	591.93	10,411.29
069/70	927.00	930.96	978.03	1,029.24	1,024.20	993.87	962.64	984.69	872.73	561.87	527.76	719.55	10512.54
070/71	868.77	843.12	996.39	961.38	983.43	969.48	888.93	833.31	909.81	985.5	929.61	722.79	10892.52
071/72	758.07	870.93	882.9	844.83	801.81	833.49	910.89	886.77	812.88	904.86	920.7	796.68	10224.51
072/73	920.25	941.49	968.22	971.37	889.02	956.16	896.67	855.36	883.39	846.00	982.98	880.83	10991.74
073/74	881.31	566.82	488.61	791.19	958.95	909.36	773.10	729.81	915.48	172.62	101.25	756.36	8044.86
074/75	969.75	918.81	1019.61	975.6	877.59	421.47	897.84	823.05	883.62	886.23	702.09	811.08	10186.74
075/76	927.27	904.77	924.30	885.33	806.22	922.86	815.00	761.80	802.30	909.81	708.39	661.95	10030.00
Till Date Generation, MWh												325,656.49	



# FEWA HYDROPOWER STATION

## INTRODUCTION:

Fewa hydropower station is a canal drop type power station having an installed capacity of 1.0 MW and located at Birauta, Pokhara with an annual design generation of 6.5 GWh. It consists of 4 units each 0.25 MW. It was commissioned in 1969 AD and developed jointly by Government of India and Government of Nepal. The public encroachment of power canal leading to power house is a concern for normal operation regardless of the availability of generating units.



Fig: Fewa Hydropower Station

The cumulative generation of the station has reached 95.59 GWh till 2075/76 from its first run. The station has generated 1.53GWh in FY 2075/76.

## PRESENT STATUS:

Presently, only Unit No. 1 & 3 are in operation at rated capacity while remaining Unit No. 2 and 4 have problems

in generator-turbine coupling. Efforts have been made to bring all the units into operation as soon as possible. However, operation of only two units at a time is possible due to insufficient canal inflow.

## REPAIR AND MAINTENANCE ACTIVITIES:

The following activities were performed during FY 2075/76.

### MECHANICAL MAINTENANCE:

- Maintenance of governor, excitation system, high pressure oil system.
- Maintenance of main inlet valve and bypass valve.
- Repair and maintenance of draft tube of Unit No. 1
- Drain valve and cooling system maintenance.



Fig: Butterfly valve maintenance





Fig: Unit no 3 maintenance work

## ELECTRICAL MAINTENANCE:

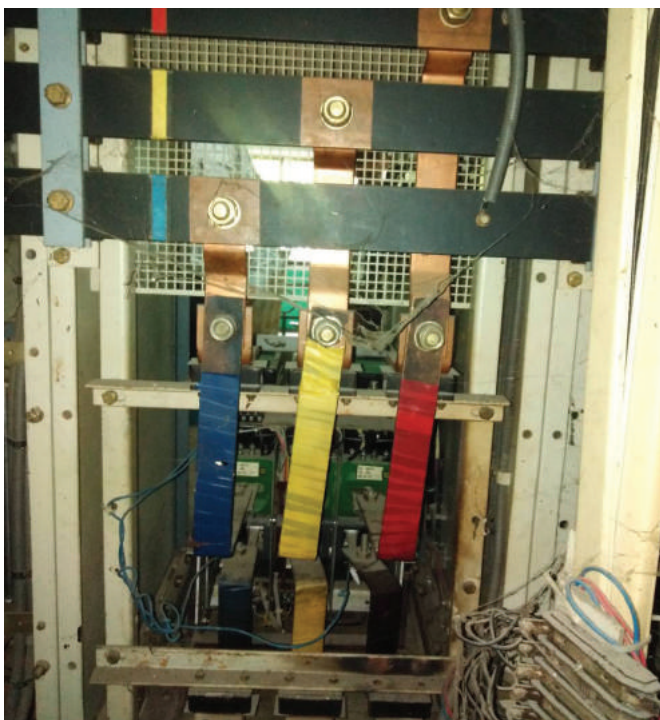


Fig: VCB Maintenance

- Replacement of 11kV lightning arrester, drop out fuses and 200-400A load disconnecting switches.
- Repair and maintenance of generator of unit no 3.
- Replacement of Air Circuit Breaker (ACB) of unit no 1.
- Replacement of damaged and old pin insulators of 11kV line.
- Complete wiring changes of unit no 1 and 2.

## CIVIL MAINTENANCE:

- Repair and maintenance of forebay gate
- Protection works of old buildings and civil structures.
- Repair and maintenance of approximately 300 m power canal.
- Installation of new intake gate along with slope protection work.
- Repair and maintenance of power house as well as tail race.

## ONGOING WORKS

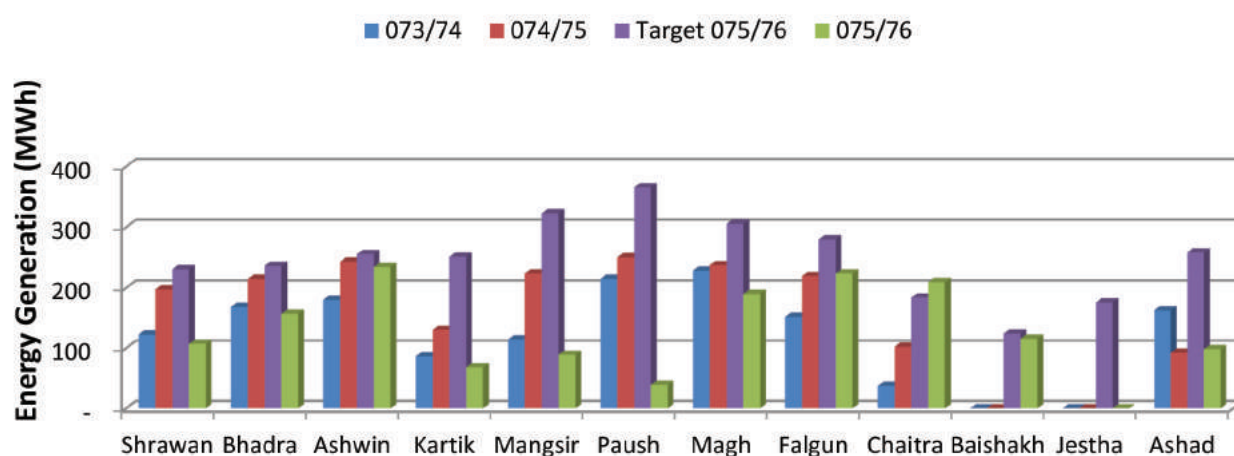
The ongoing modification and renovation works of electromechanical parts as well as control system and replacement of existing governor with digital governor and SCADA embedded control panel will be initiated very soon.



## SALIENT FEATURES OF FEWA HPS

Type	Canal Drop
Location	Pokhara
Installed capacity	1.0 MW
Annual average energy	6.5 GWh
Maximum Net head	74.68 m
Total length of the waterways	1.0 km
Penstock	
<b>Turbine</b>	
Number and Type	4, Horizontal Francis
Rated speed	1000 rpm
<b>Generator</b>	
Rated output	288 kW
Rated voltage	400 V
Rated frequency	50 Hz
Power transformer	350 kVA, 0.4/11 kV, 4 Nos.
Transmission line	11 kV

## Monthly Energy Generation





## Energy generation data of FEWA HPS in MWh

Fewa Hydropower Station

Unit: MWh														
Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	
Generation	326.66	615.16	819.72	1013.17	1254.45	1738.81	1488.87	2961.13	3410.38	3919.47	3761.97	2884.24	2247.54	
Year	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	
Generation	1371.48	3433.32	1682.71	1035.21	1579.49	2061.91	1599.45	2532.68	1986.69	843.56	489.16	2104.02	1849.52	
FY/Month	Shrawan	Bhadra	Asoj	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Asadh	Total	
2051													2,012.91	
2052													2,404.10	
053/54	115.46	97.09	97.85	460.10	431.19	305.30	265.75	0.00	0.00	97.17	519.23	478.59	2,867.73	
054/55	87.47	41.47	127.91	174.31	188.83	462.04	395.45	199.44	40.03	0.00	209.43	300.05	2,226.43	
055/56	168.12	57.26	136.19	266.40	425.59	482.13	293.79	285.73	28.00	0.00	0.00	315.69	2,458.90	
056/57	97.56	6.29	11.65	268.47	383.28	313.48	260.25	192.22	110.56	265.25	214.08	107.41	2,230.50	
057/58	26.15	46.11	64.51	250.05	52.15	338.22	207.52	113.92	2.80	0.00	0.00	0.00	1,101.43	
058/59	0.00	13.17	0.00	156.58	229.58	296.02	193.90	176.19	120.52	63.22	0.00	0.00	1,249.18	
059/60	0.00	0.00	0.00	0.00	303.16	354.28	272.18	197.20	139.49	169.91	188.15	120.54	1,744.91	
060/61	109.16	97.59	135.38	75.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	109.68	527.27	
061/62	56.23	103.74	159.73	65.02	238.71	234.24	230.18	117.88	20.87	1.81	35.76	88.24	1,352.41	
062/63	202.22	274.01	278.35	152.22	319.45	329.12	267.23	190.58	226.24	96.77	0.00	37.28	2,373.47	
063/64	164.44	165.50	194.42	96.86	377.00	405.45	273.45	287.60	105.23	0.00	117.43	217.87	2,405.25	
064/65	0.00	0.00	0.00	0.00	0.00	182.61	207.58	140.77	268.69	170.55	113.19	132.72	1,216.11	
065/66	261.07	151.78	210.11	203.19	377.26	411.02	300.52	172.64	89.72	2.50	-	-	2,179.81	
066/67	-	-	110.05	188.69	336.95	356.29	285.86	124.03	-	-	-	23.31	1,425.18	
067/68	156.62	144.19	134.62	78.41	280.06	356.88	235.70	203.54	96.98	-	-	226.49	1,913.49	
068/69	207.86	150.90	159.24	150.18	187.72	247.65	190.22	229.24	219.13	125.96	4.11	-	1,872.21	
069/70	263.05	238.12	228.16	104.25	0	137.34	303.77	343.01	146.94	83.52	24.2	209.6	2081.96	
070/71	219.99	218.91	254.94	121.17	222.9	249.58	232.5	215.6	100.9	64.73	0	148.92	2050.14	
071/72	213.03	214.69	262.6	104.11	270.38	362.94	282.77	197.66	171.52	102.8	0	128.24	2310.74	
072/73	150.05	168.84	180.82	122.55	195.60	228.59	225.15	130.27	109.21	26.53	0	127.16	1664.77	
073/74	122.48	168.43	180.27	86.39	114.53	214.88	228.40	152.29	37.46	0	0	162.56	1467.69	
074/75	157.55	214.59	243.39	130.34	223.82	250.41	237.35	219.53	102.27	0	0	92.43	1911.68	
075/76	107.05	157.01	234.24	67.96	89.09	39.28	190.0	223.80	209.30	115.53	0	98.42	1531.68	
Till Date Generation, MWh														95,590.72

# SUNDARIJAL HYDROPOWER STATION

## INTRODUCTION:

Sundarijal Hydropower Station, located at Sundarijal, 15 km northeast of Kathmandu with installed capacity of 640 kW and annual design generation of 4.77 GWh was commissioned in 1934 AD in a grant from British government. Both the Pelton units, each with 320 kW, are in normal operation and have the capacity to operate in full load when required. The penstock and station flows are part of the water supply system to Kathmandu Valley looked after by Kathmandu Upatayaka Khanepani Limited (KUKL).

The cumulative generation of the station has reached 128.865GWh so far from its first run. The station has generated 4.33 GWh in FY 2074/75 and 3.58GWh in FY 2075/76 with a decrease of 17.19% compared to previous year generation.



Sundarijal HPP

## PRESENT STATUS:

The rehabilitation construction works of Sundarijal Hydropower station is funded under the joint assistance from ADB and GoN. Nepal Electricity Authority has received loan (Loan Number 2808-NEP, Grants 0270-NEP and 0271-NEP) from Asian Development Bank (ADB) towards the cost of Power Efficiency Improvement as part of Electricity Transmission Expansion and Supply Improvement Project - a loan portion of which has been budgeted for Rehabilitation and upgrading of Sundarijal hydropower plant from 640 kW to 970kW. The rehabilitation works largely consists of Electromechanical rehabilitation work with modernization of Plant Control System and civil improvement work at intake and headpond. The consulting part for the design of the plant served by individual international consultancy has been completed whereas the rehabilitation construction works of Sundarijal Hydropower station is in progress. The contract for Sundarijal Hydropower Station Rehabilitation in EPC model has been awarded on April 2017 based on the inception report of the consultant. The access road to the powerhouse has rebuilt with upgradation for easy transportation of heavy equipment, which was stored in NEA's Training Centre, Kharipati. The execution of the project is going on and now unit no. 2 is dismantled, primary foundation of same unit is completed. The erection of control and protection panel is on progress. The project is scheduled to be completed by December 2019. The power plant rehabilitation contract cost is INR 65,843,265.00 and the contractor for the Rehabilitation Work is Power Mech-Pentflo-Zillion JV.





## REPAIR AND MAINTENANCE ACTIVITIES:

The following activities were accomplished during FY2075/76:

### ELECTRO-MECHANICAL MAINTENANCE:

- Repair and maintenance of main inlet valve.
- Penstock repair and maintenance works.

### CIVIL MAINTENANCE:

- Repairing of saddles of penstock which are in critical condition (Total no. of saddles repaired are 29).

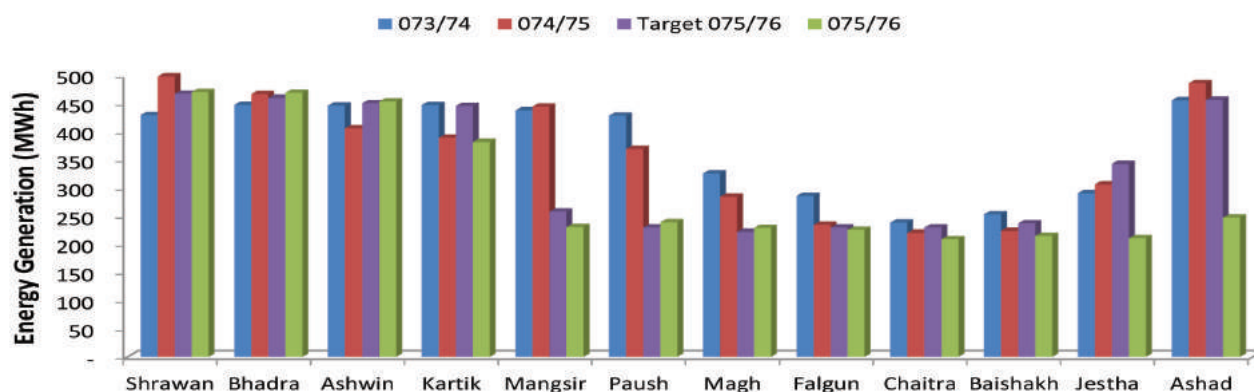


Fig: Main inlet valve inspection after damage

### SALIENT FEATURES OF SUNDARIJAL HPS

Type	Run of river
Location	Sundarijal, Kathmandu
Installed capacity	640 kW
Annual average energy	4.77 GWh
Maximum Net head	216.0 m
Penstock	1386m long, Dia 0.45m/0.30m
<b>Turbine</b>	
Number and Type	2, Horizontal Pelton
Rated output	485 kW
Rated speed	900 rpm
<b>Generator</b>	
Rated output	377 kVA
Rated voltage	3.3 kV
Rated frequency	50 Hz
Power factor	0.85
Power transformer	2.7/11kV, 2 Nos.
Transmission line	11 kV

### Monthly Energy Generation





## SUNDARIJAL HYDROPOWER STATION

Unir: MWh

FY/Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Paush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
Till 057/58													56,320.37
058/59	236.00	401.00	415.33	399.66	385.66	394.33	407.33	338.00	300.33	265.33	205.66	225.66	3,974.29
059/60	308.33	344.33	179.33	230.66	216.33	231.00	228.33	223.33	233.00	238.00	298.66	427.33	3,158.63
060/61	415.66	398.33	358.00	285.00	357.33	406.00	380.33	303.66	255.33	253.33	373.66	306.33	4,092.95
061/62	429.00	438.66	410.33	409.66	408.66	414.66	362.66	325.66	297.66	260.00	224.66	230.00	4,211.62
062/63	231.33	236.55	250.99	226.55	200.31	232.33	254.00	194.33	195.00	195.00	240.66	155.33	2,612.39
063/64	345.00	378.66	420.21	434.33	406.33	404.00	354.00	225.32	238.66	294.33	401.00	453.66	4,355.50
064/65	450.33	447.54	448.66	456.66	443.33	424.88	186.67	296.83	235.66	240.00	308.66	406.66	4,345.89
065/66	444.66	448.33	415.66	438.33	370.00	252.33	269.00	282.98	253.66	219.66	303.66	364.00	4,062.27
066/67	506.58	486.66	474.51	385.00	432.33	404.33	302.33	267.33	225.33	217.00	217.00	431.33	4,349.73
067/68	460.33	390.00	392.00	459.66	429.33	189.66	162.33	282.00	243.66	288.00	391.66	432.99	4,121.61
068/69	431.00	425.33	440.00	456.33	426.33	380.00	322.66	306.00	266.00	241.33	252.33	398.33	4,345.62
069/70	369.66	382.33	419.66	444.33	402.00	340.66	311.00	288.00	216.66	208.00	367.33	448.66	4,198.29
070/71	451.00	454.33	440.33	259.00	238.00	273.66	236.66	204.00	172.33	102.00	245.00	405.00	3,481.29
071/72	441.00	435.33	420.33	453.00	436.00	394.66	310.00	319.33	289.66	278.33	389.32	363.32	4,530.26
072/73	452.66	427.00	453.00	478.00	451.33	342.33	286.66	256.33	219.66	187.66	321.00	418.33	4,293.95
073/74	429.57	447.55	446.32	447.32	438.00	428.66	326.00	286.33	239.66	253.99	291.33	455.95	4,490.68
074/75	498.00	466.66	406.00	389.33	444.33	369.66	284.66	235.33	221.00	224.66	306.66	486.00	4,332.29
075/76	470.33	468.99	453.66	382.00	231.33	240.00	229.66	226.33	209.67	215.67	211.67	248.00	3,587.30
Till Date Generation, MWh													128,864.92

# PHARPING HYDROPOWER STATION

## INTRODUCTION:

Pharpping Hydropower Station, commissioned in May, 1911 is the first power station in Nepal. The Hydro Power Station was inaugurated by the late king Prithivi Bir Bikram Shah Dev on Monday, 22 May, 1911 (B.S. 1968, 9 Jestha, Monday) at 6:30 PM, more than 100 years, back by switching on lights in Tundikhel, Kathmandu.

The Power Station located in Pharpping of Kathmandu district, nearly 12 km south from the heart of the city is considered to be the second oldest hydro power station in Asia. The Power Station utilizes spring water from Satmule and Shesh Narayan area. There are two units each with rated capacity of 250 kW in total capacity of the Power Station is 500 kW.



Fig: Golden Jubilee Manument of Pharpping HPS

## HISTORICAL BACKGROUND:

After visit of Britain by Rana Prime Minister Chandra Samser in 1964 B.S. (1907 AD), a hydro power station was proposed to be constructed. A committee was formed under executive engineer Col. Kishor Narasingh Rana for planning of the hydropower station. The committee selected Pharpping site for the Power Station and preliminary work started.

An electrical engineer, Mr. Barnau Puwante from Britain arrived for detail estimate and to proceed the work further. Another engineer, Mr. Linzale from General Electric Co. arrived for erection and installation of equipments. Nepali executive engineer Col. Kishor Narsingh Rana, superintending engineer Col. Kumar Narsingh Rana and other Nepali overseers, technicians and a few technicians from India too were engaged in the construction/erection works. The construction works were completed in mere 20 months and 15 days.

## PROJECT COST:

For the construction and erection of Pharpping hydropower station, various costs were incurred by Government of Nepal, which are as follows:



1.	Pipeline / Head works / Reservoir-	196,324.84
2.	Powerhouse/Colony/Tailrace and widening of Bagmati River	- 156,778.31
3.	Substation / Office / Store	- 36,175.80
4.	Transmission Line/Street Light/Distribution Line and Telephone Line	- 111,049.50
5.	London to Calcutta Transportation/ packing/Commission of Agent	- 28,699.26
6.	Kalkota to Bhimphedi Transportation	- 40,311.79
7.	Bhimphedi to Site	- 40,372.32
8.	Salary/ Wages	- 103,565.00
	Total (NRs)	- 713,273.82

The costs of equipments (Generators, Turbines etc.) are not included in the above cost. They seemed to be given on grant by British Government to Nepal. Out of the total cost of Rs. 7, 13,273.82 borne by the Government of Nepal of which Rs. 3, 67,984.00 were spent locally inside Nepal.

## OPERATION AND MAINTENANCE:

Pharphing Hydropower Station was generating energy till 1982 AD (2038 B.S.). During the year, there was drinking water crisis in Kathmandu valley and surplus electricity was observed after completion of Kulekhani-I Hydropower Station. So, the water from the reservoir was used for consumption use with temporary diversion from penstock just before entering into the power station. Till

date priority is given for drinking water due to water crisis in the valley.

After 25 years of shutdown of the Power House, equipments like Turbines, Governors, Control Panels, Control and Protection circuits, Transformer, DC-Supply System etc. were repaired and overhauled in Fiscal Year 2062/63 (2005/2006 AD) and both units were tested and commissioned with local load. It was synchronized with Integrated Nepal Power System (INPS) again on December 20, 2006 (Poush 05, 2063). The power station has been running frequently to keep the equipments of historic Power Station in operational condition.

Currently, there are 4 employees working in the Power Station.



Fig: Machine floor



**SALIENT FEATURES OF POWER STATION:**

1.	Reservoir		
		Diameter	200 ft
		Depth	18 ft
		Total Storage Capacity	5, 28,783.00 cu. ft.
2.	Penstock Pipe		
		Diameter (internal)	20 inch
		Total length of pipes	2538 feet
3.	Power Station General		
		Design Head	682 feet
		Installed Capacity	500 kW
		Number of units	2
4.	Turbine Generator Sets		2
5.	Shaft Configuration		Horizontal
6.	Turbine		
		Type	Pelton
		Revolution	600 rpm
		Manufacturer	GE company, USA
7.	Generator		
		Type	Synchronous, 3 Phase
		Capacity	312.5 kVA
		Power Factor	0.8
		Rated Voltage	3.3 kV
		Rated Current	54.8 A
		Configuration	Y
		Excitation Voltage	37 V
		Excitation Current	169 A
8.	Transformer		
		Capacity	350 kVA
		Voltage Level	3.3/11 kV
		Numbers	2
9.	Breaker Type		MOCB all
10.	M/C Synchronized		11 kV
11.	Overhead Transmission Line		
		Length	6 miles
		Poles	Steel
		Type	Wooden
		Two major crossings	
		on Bagmati River	600 ft & 800 ft long

# TINAU-SUNDARIJAL REHABILITATION PROJECT

The rehabilitation construction works of Sundarijal Hydropower station is funded under the joint assistance from ADB and GoN. Nepal Electricity Authority has received loan (Loan Number 2808-NEP, Grants 0270-NEP and 0271-NEP) from Asian Development Bank (ADB) towards the cost of Power Efficiency Improvement as part of Electricity Transmission Expansion and Supply Improvement Project - a loan portion of which has been budgeted for Rehabilitation and upgrading of Sundarijal hydropower plant from 640 kW to 970kW. The rehabilitation works largely consists of Electromechanical rehabilitation work with modernization of Plant Control System and civil improvement work at intake and headpond. The consulting part for the design of the plant served by individual international consultancy has been completed whereas the rehabilitation construction works of Sundarijal Hydropower station is in progress. The contract for Sundarijal Hydropower Station Rehabilitation in EPC model has been awarded on April 2017 based on the inception report of the consultant. The access road to the powerhouse has rebuilt with upgradation for easy transportation of heavy equipment, which was stored in NEA's Training Centre, Kharipati. The execution of the project is going on and now unit no. 2 was dismantled, primary foundation of same unit is completed. The erection of control and protection panel is on progress. The project is scheduled to be completed by December 2019. The power plant rehabilitation contract cost is INR 65,843,265.00 and the contractor for the Rehabilitation Work is Power Mech-Pentflo-Zillion JV.

The rehabilitation and upgradation work for other power plant -Tinau Hydropower Station located at Butwal is underway with joint assistance of GON and NEA.

Currently, the feasibility study is in approval phase for upgradation of plant from 1 MW to 3 MW.



Fig: Unit 2 Primary Foundation Work in progress



Fig: Unit 2 Installation Works

# Technical Support Department (TSD)

Technical Support Department, headed by Director, provides expert advice for the under-construction projects and existing power plants as required by the respective Projects, and, Operation and Maintenance Department. Deputy Managing Director, Generation Directorate, coordinates between the Technical Support Department and Projects or Operation and Maintenance Department.

Technical Support Department mainly serves for the technical assistance and supports for the NEA projects

which are under construction process and provides the much needed expert advice to the arising problems of operational plants of NEA. Thus technical support department deals with framework for operation and maintenance of NEA hydropower projects and also executes proper guidelines, supervision and monitoring works of various civil, mechanical and electrical related maintenance works at NEA power plants.



Fig: Visit at Kaligandaki 'A' HPS by MD & Board Members

## Generation Operation and Maintenance

Annual Energy Generation per Installed capacity (GWh / MW)

Power Stations Fiscal Year	Kaligandaki A	Mid-Marsyangdi	Marsyangdi	Chameliya	Trishuli	Gandak	Modi	Devighat	Sunkoshi	Puwa	Chatara	Panauti	Seti	Fewa	Sundarjal	Kulekhanil	Kulekhanil	Pharphing	Mutituel	Hetauda Diesel
Total Installed Capacity (MW)	144	70	69	30	24	15	14.8	15	10.05	6.2	3.2	2.4	1.5	1.0	0.64	60	32	0.5	39.90	14.10
2041/42					3.71	2.43		3.30	4.26							1.73				
2042/43					3.66	2.87		3.44	5.71							2.91				
2043/44					4.22	3.48		4.45	4.48							3.17	2.04			0.002
2044/45					4.44	3.15		4.90	1.16							3.30	3.24			0.007
2045/46					4.54	2.14		5.26	4.83							2.85	2.66			0.618
2046/47			3.37		4.01	3.27		4.77	4.18							2.21	2.00			0.009
2047/48			5.06		4.38	2.45		5.18	4.78							2.72	2.25		0.007	0.014
2048/49			5.99		4.38	2.66		5.05	4.94							1.95	1.56		0.508	0.780
2049/50			5.83		4.61	2.33		5.42	5.22							1.19	0.89		0.910	0.790
2050/51			6.14		3.67	2.11		4.27	5.83							1.80	1.28		1.420	0.344
2051/52			6.52		2.78	1.90		3.28	6.12					2.01		1.88	1.64		1.911	0.275
2052/53			7.01		5.66	1.92		6.19	6.27		0.00			2.40		2.79	2.49		0.718	0.545
2053/54			6.74		6.43	2.39		6.78	5.53		0.23		7.04	2.87		2.80	2.44		0.736	0.664
2054/55			6.52		5.55	1.45		6.32	5.91		0.08		5.32	2.23		2.03	1.83		2.147	1.325
2055/56			6.84		4.56	1.67		5.24	5.45		0.19		6.20	2.46		3.26	3.00		2.161	1.717
2056/57			6.63		6.31	2.52		7.09	6.59	1.15	0.69		6.23	2.23		4.16	3.84		1.336	0.785
2057/58			6.25		5.90	2.02	2.80	6.40	5.40	3.44	-		6.20	1.10		2.93	2.56		0.484	0.369
2058/59	0.82		5.60		5.34	1.27	3.46	6.10	5.06	3.90	0.03	1.94	5.36	1.25	6.21	2.42	2.05		0.342	0.216
2059/60	3.56		4.84		4.90	2.01	3.67	5.62	5.25	4.22	0.16	0.59	6.13	1.74	4.94	2.83	2.32		0.104	0.019
2060/61	3.66		3.55		4.04	0.55	3.07	4.57	4.99	5.06	0.73	1.58	5.72	0.53	6.40	2.68	2.05		0.219	0.079
2061/62	3.83		4.87		5.12	1.38	2.85	5.60	5.00	4.74	0.66	1.54	6.10	1.35	6.58	2.90	2.25		0.279	0.156
2062/63	4.31		5.35		5.60	1.80	3.14	6.34	5.11	4.67	0.74	1.28	6.44	2.37	4.08	1.91	1.48		0.315	0.250
2063/64	4.91		5.82		5.38	2.04	4.55	6.17	5.63	5.24	0.84	1.21	7.14	2.41	6.81	2.30	1.72	0.01	0.258	0.214
2064/65	5.27		5.98		5.56	1.37	3.64	6.10	5.28	5.59	0.62	1.28	7.22	1.22	6.79	2.55	1.61	0.10	0.197	0.093
2065/66	5.23	2.41	5.87		4.79	1.37	4.22	5.43	6.03	5.11	0.43	0.78	7.25	2.18	6.35	1.25	1.15	0.04	0.133	0.265
2066/67	5.28	5.57	5.87		5.64	1.00	3.45	6.40	5.71	4.85	0.39	1.20	7.47	1.43	6.80	1.45	1.36	0.01	0.243	0.242
2067/68	5.38	5.39	6.13		5.34	0.76	4.05	4.94	6.01	5.09	0.66	1.14	7.74	1.91	6.44	1.65	1.58	-	0.059	0.095
2068/69	5.98	6.08	6.46		5.62	0.87	2.34	7.01	6.61	4.57	0.49	0.53	6.94	1.87	6.79	2.39	2.23	0.07	0.016	0.067
2069/70	5.88	6.12	6.52		5.20	1.28	2.08	6.70	6.33	4.91	0.51	0.63	7.01	2.08	6.56	1.55	0.12	0.030	0.039	0.170
2070/71	6.00	6.20	6.69		4.66	0.59	2.81	6.36	6.43	4.77	0.74	0.92	7.26	2.05	5.44	1.57	0.15	0.012	0.128	0.331
2071/72	6.46	6.53	6.85		5.20	0.12	3.98	6.52	2.29	5.23	0.02	0.68	6.84	2.31	7.08	1.50	0.14	0.009	-	0.087
2072/73	5.21	6.22	6.40		5.21	1.08	4.24	6.29	3.58	5.46	-	0.86	7.33	1.66	6.71	1.19	0.11	0.004	-	0.008







## NEPAL ELECTRICITY AUTHORITY

### Generation Operation and Maintenance Annual Energy Generation per Installed capacity (GWh / MW)

Power Stations Fiscal Year	Kali Gandaki A	Mid-Marsyangdi	Marsyangdi	Chameliya	Trishuli	Gandak	Modi	Devighat	Sunkoshi	Puwa	Chatara	Panauti	Seti	Fewa	Sundarjal	Kulekhanil	Kulekhanili	Pharphing	Multifuel	Hetauda Diesel
2073/74	5.85	6.50	6.74		5.25	1.46	4.70	6.51	4.60	5.87	-	1.08	5.36	1.47	7.02	1.22	0.12	0.002	0.001	0.023
2074/75	6.01	6.25	6.49		5.05	1.16	4.49	5.75	5.48	5.77	-	0.46	6.79	1.91	6.77	1.04	1.06	-	-	0.009
2075/76	6.06	6.73	6.89	5.38	5.16	0.80	4.69	5.79	6.18	5.51	0.84	1.25	6.87	1.53	5.60	1.52	1.40	-	-	0.008
Energy Forecast (GWh)2075/076	825.25	444.92	471.31	184.20	137.61	33.36	70.97	93.20	58.19	36.05	3.55	3.40	10.56	2.99	4.03	108.55	48.69	-	-	-

## TRIPPING RECORD OF F/Y 2075/76

S.No.	Power Stations	Total Installed Capacity (MW)	Total No. of Units Installed	Weightage of P/S (%)	Running Hour	Plant Tripping hrs	No. of Times (T)	Unit Tripping hrs	No. of Times (T)	Remarks
1	Kaligandaki 'A'	144.00	3 x 48	26.05%	20,039.67	217.20	88.00	12.55	11.00	
2	Middle Marsyangdi	70.00	2 x 35	12.66%	14,675.01	57.15	63.00	1.30	13.00	
3	Marsyangdi	69.00	3 x 23	12.48%	20,024.69	15.72	55.00	6.66	30.00	
4	Kulekhani-I	60.00	2 x 30	10.85%	4,078.47	0.00	0.00	0.00	0.00	Excluding Forced Outages
5	Kulekhani-II	32.00	2 x 16	5.79%	4,263.38	0.00	0.00	0.00	0.00	
6	Chameliya	30.00	2 x 15	5.43%	12,059.80	214.00	142.52	33.00	54.55	
7	Trishuli	24.00	6 x 3.5 1 x 3	4.34%	45,873.09	63.70	19.00	116.90	51.00	
8	Gandak	15.00	3 x 5	2.71%	4,385.90	120.06	223.00	0.00	0.00	
9	Modi Khola	14.80	2 x 7.4	2.68%	12,703.83	547.90	169.00	515.62	169.00	
10	Devighat	15.00	3 x 5	2.71%	22,622.11	118.27	129.00	65.77	53.00	
11	Sunkoshi	10.05	3 x 3.35	1.82%	21,677.25	96.91	67.00	322.33	48.00	
12	Ilam (Puwa Khola)	6.20	2 x 3.1	1.12%	12,963.70	100.75	112.00	33.35	56.00	
13	Chatara	3.20	2 x 1.6	0.58%	4,330.00	1013.00	250.00	0.00	0.00	
14	Panauti	2.40	3 x 0.8	0.43%	4,910.20	14.00	7.00	128.00	64.00	
15	Seti	1.50	3 x 0.5	0.27%	23,013.87	-	231.00	-	60.00	
16	Fewa	1.00	4 x 0.25	0.18%	8,500.93	-	100.00	-	41.00	
17	Sundarjal	0.64	2 x 0.32	0.12%	11,032.69	138.00	69.00	0.00	0.00	
18	Pharphing	0.50	2 X 0.25	0.09%	-	NA	NA	NA	NA	Not in Operation
19	Multifuel	39.00	6 X 6.5	7.06%	-	NA	NA	NA	NA	Not in Operation
20	Hetauda Diesel	14.49	4 x 2.53X 1.47	2.62%	108.76	NA	NA	NA	NA	Run only for testing Purpose

## Generation Operation and Maintenance

Generation Declaration/ Forecast for the FY 2073/74 (FY 2016/17 A.D.)

S.N	PowerStations	Installed Capacity	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total(MWh)
1	KaligandakiA	144	64,969.35	92,725.42	88,455.16	80,673.06	76,384.26	57,316.59	43,597.49	42,067.21	49,313.27	61,166.33	88,048.05	91,043.79	835,759.98
2	MiddleMarsyangdi	70	48,538.83	47,592.46	47,204.25	44,003.47	34,392.29	25,864.97	18,336.71	19,999.37	22,143.68	31,330.53	44,758.99	48,273.34	432,438.89
3	Marsyangdi	69	46,997.94	46,292.53	45,299.43	46,778.70	40,979.27	32,344.27	25,133.16	23,704.06	24,091.43	35,058.73	47,336.79	47,359.08	461,375.39
4	Trisuli	24	12,083.65	11,891.17	12,130.13	12,593.78	12,316.98	11,365.98	9,273.49	8,725.33	9,631.72	10,971.78	12,248.18	11,956.69	135,188.85
5	Gandak	15	3,166.00	3,091.34	3,381.72	304.32	250.00	2,788.89	2,399.40	2,043.13	674.46	250.00	2,224.03	3,014.03	23,587.32
6	Modikhola	14.8	4,995.62	6,936.02	7,745.67	7,496.46	5,419.45	4,327.54	3,319.76	3,314.90	4,667.78	5,708.28	7,258.05	6,466.13	67,655.66
7	Devghat	15	8,934.88	8,658.52	9,059.35	9,617.11	9,705.58	9,029.26	7,707.70	7,595.31	8,396.03	8,504.36	9,241.51	8,616.55	105,066.14
8	Sunkoshi	10.05	86.00	2,928.78	3,121.25	5,768.37	5,118.65	4,196.07	3,357.82	3,175.00	3,594.56	4,103.58	5,436.27	2,891.67	43,778.02
9	Ilam(PuwaKhola)	6.2	4,354.51	4,163.85	4,262.85	4,405.56	3,098.42	2,229.58	1,782.40	2,081.56	1,579.74	2,011.63	3,022.72	4,037.60	37,030.41
10	Chatara	3.2	-	-	-	-	-	-	-	576.00	576.00	576.00	691.20	806.40	3,225.60
11	Panauti	2.4	301.22	426.17	379.45	308.89	246.59	242.67	149.98	143.56	100.34	113.62	121.69	215.39	2,749.57
12	Seti	1.5	883.59	611.66	922.51	927.91	936.81	936.46	903.21	886.51	900.09	884.15	884.35	829.09	10,506.32
12	Fewa	1	181.95	204.07	217.45	132.88	234.46	269.64	233.64	240.48	187.49	107.75	41.03	163.17	2,214.02
13	Sundarjal	0.64	472.44	458.09	453.45	450.21	423.73	391.71	344.90	305.15	269.36	259.22	365.76	430.58	4,624.61
	A.TOTALROR	376.79	195,965.97	225,980.08	222,632.66	213,460.71	189,506.48	151,303.61	109,013.25	106,191.31	112,022.11	146,886.01	187,521.27	222,280.21	2,165,200.76
14	Kulekhanil	60	5,980.70	4,288.40	4,979.70	4,178.70	5,999.70	10,336.60	13,047.40	13,499.60	15,819.30	13,340.60	7,559.90	5,338.80	104,369.40
15	Kulekhanill	32	3,189.71	2,287.15	2,655.84	2,228.64	3,199.84	5,512.85	6,958.61	7,199.79	8,436.96	7,114.99	4,031.95	2,847.36	55,663.68
	B.TotalReservoir	92	9,170.41	6,575.55	7,635.54	6,407.34	9,199.54	15,849.45	20,006.01	20,699.39	24,256.26	20,455.59	11,591.85	8,186.16	160,033.08
	GrandTotal(A+B)	468.79	205,136.38	232,555.63	230,268.20	219,868.05	198,706.02	167,153.06	129,019.26	126,890.69	136,278.37	167,341.60	199,113.11	230,466.37	2,325,233.84

**ACTUAL GENERATION FOR THE FY 2073/74 (FY 2016/17A.D.)**

S.No.	Power Stations/ Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
1	Kaligandaki 'A'	60,206.00	89,668.00	90,518.00	91,053.00	80,170.00	53,708.00	42,031.00	39,253.00	51,118.00	60,017.00	88,297.00	96,110.00	842,149.00
2	Mid-Marsyangdi	48,932.74	49,469.13	47,004.38	47,550.87	38,579.13	27,121.87	21,285.00	20,666.25	27,627.25	32,370.88	44,234.75	49,809.37	454,651.62
3	Marsyangdi	46,750.40	46,225.10	46,015.90	47,630.50	43,117.30	30,838.70	24,960.00	22,961.80	31,122.10	34,827.00	44,950.10	45,906.60	465,305.50
4	Kulekhani I	3,946.00	566.00	256.00	723.00	918.00	6,253.00	10,743.00	13,289.00	14,232.00	13,226.00	6,141.00	3,109.00	73,402.00
5	Kulekhani II	1,760.66	297.25	256.12	442.12	618.48	3,265.20	5,387.70	6,789.00	7,367.00	6,831.50	3,137.10	1,643.00	37,795.13
6	Trishuli	10,409.90	10,154.50	10,322.60	11,345.60	11,523.00	10,950.50	9,570.70	9,153.00	9,022.40	11,230.50	11,474.30	10,812.40	125,969.40
7	Gandak	954.30	1,846.90	2,112.40	683.90	928.70	3,086.70	3,008.80	2,990.80	1,262.90	-	1,491.70	3,505.60	21,872.70
8	Modi	4,344.10	6,607.30	8,188.80	9,023.00	6,664.20	4,465.60	3,128.40	3,022.40	4,143.20	5,476.80	7,891.00	6,601.60	69,556.40
9	Devghat	8,081.99	8,334.08	8,169.93	8,614.03	8,927.98	8,653.23	7,642.74	7,275.52	6,876.10	8,339.48	8,556.50	8,138.38	97,609.96
10	Sunkoshi	8.60	2,772.20	4,252.70	6,527.20	5,728.10	4,261.20	3,684.50	2,881.40	3,503.90	3,492.90	4,794.10	4,283.90	46,190.70
11	Puwa	4,457.24	4,408.80	4,239.61	4,279.92	3,478.20	2,269.38	1,535.49	1,331.75	1,836.17	1,877.65	2,587.23	4,112.81	36,414.24
12	Chatara	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Panauti	188.82	312.55	397.08	405.94	324.72	260.02	144.60	79.82	73.21	118.13	81.20	217.24	2,603.33
14	Seti	881.31	566.82	488.61	791.19	958.95	909.36	773.10	729.81	915.48	172.62	101.25	756.36	8,044.86
15	Fewa	122.48	168.43	180.27	86.39	114.53	214.88	228.40	152.29	37.46	-	-	162.56	1,467.69
16	Sundarjal	429.57	447.55	446.32	447.32	438.00	428.66	326.00	286.33	239.66	253.99	291.33	456.00	4,490.73
17	Pharping	-	0.14	0.06	0.11	0.07	0.04	0.031	0.167	0.128	0.035	0.055	0.063	0.88
	Total (Hydro)	191,474.11	221,844.75	222,848.78	229,604.08	202,489.35	156,686.35	134,449.46	130,862.34	159,376.96	178,234.48	224,028.61	235,624.88	2,287,524.14
18	Multifuel	-	-	-	-	-	-	-	-	26.66	-	-	-	26.66
19	Hetauda Diesel	7.75	7.23	7.68	59.79	8.17	8.80	5.77	7.31	167.63	33.73	5.65	6.48	325.98
	Total (Thermal)	7.75	7.23	7.68	59.79	8.17	8.80	5.77	7.31	194.29	33.73	5.65	6.48	352.64
	Grand Total	191,481.86	221,851.98	222,856.46	229,663.87	202,497.52	156,695.14	134,455.22	130,869.65	159,571.25	178,268.21	224,034.26	235,631.36	2,287,876.78

Note: Provisional figures subjected to final audit

## Generation Operation and Maintenance

Generation Declaration/ Forecast for the FY 2074/75 (FY 2017/18 A.D.)

S.N	Power Stations	Installed Capacity (MW)	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
1	KaligandakiA	144	84,772.14	92,719.95	89,600.11	87,553.41	77,613.45	56,439.39	44,123.49	42,762.71	31,582.86	47,205.01	87,709.48	91,561.99	833,643.99
2	MiddleMarsyangdi	70	49,194.53	48,402.66	47,571.90	45,466.60	36,010.91	26,539.51	19,861.73	10,544.09	24,224.80	32,205.41	44,774.95	49,072.73	433,869.81
3	Marsyangdi	69	47,459.02	46,723.69	46,286.73	47,492.69	43,356.14	32,155.24	25,201.57	17,479.34	28,373.84	35,739.67	46,942.32	47,524.72	464,734.93
4	Trisuli	24	12,221.21	12,052.20	12,217.57	8,336.32	12,648.01	11,824.27	9,888.04	9,261.60	9,744.70	11,817.04	12,671.92	12,399.94	135,082.79
5	Devighat	15	8,808.85	8,680.56	8,912.44	6,029.99	9,527.98	9,137.74	7,771.59	7,605.66	8,079.05	8,665.54	9,210.55	8,632.25	101,062.18
6	Gandak	15	2,728.68	2,960.08	3,303.61	405.58	250.00	3,154.97	2,772.85	2,407.87	741.76	250.00	2,054.46	3,188.19	24,218.05
7	Modikhola	14.8	5,062.34	6,914.73	8,681.39	8,510.15	6,230.78	4,544.01	2,215.29	2,184.64	4,444.20	5,622.91	8,195.48	6,994.70	69,600.62
8	Sunkoshi	10.05	5,741.63	5,845.01	6,290.72	6,806.34	5,725.67	4,242.95	3,451.36	2,994.08	3,443.86	4,044.17	5,628.15	5,322.88	59,536.82
9	Ilam(PuwaKhola)	6.2	4,387.64	4,286.24	4,178.62	4,245.40	3,310.18	2,240.38	1,753.30	1,778.10	1,744.93	2,054.23	3,025.48	4,047.65	37,052.17
10	Chatara	3.2	-	-	-	207.80	160.18	151.65	94.77	112.47	108.33	161.19	246.87	317.32	1,560.57
11	Panauli	2.4	-	-	554.50	473.65	367.79	316.79	210.42	165.09	134.84	165.04	191.19	329.05	2,908.36
12	Sefi	1.5	869.30	777.54	822.46	900.28	962.44	942.35	870.08	840.23	909.29	682.10	664.80	810.38	10,051.25
13	Fewa	1	144.41	151.17	160.50	160.19	192.15	235.11	204.47	180.46	121.65	91.91	131.24	186.30	1,959.55
14	Sundarijal	0.64	461.50	456.42	451.85	448.90	427.75	405.10	333.22	299.36	260.53	256.88	346.65	440.83	4,589.00
	A.TOTALROR	376.79	221,851.24	229,970.25	229,032.40	217,037.31	196,783.43	152,329.45	118,752.17	98,615.70	113,914.65	148,961.09	221,793.53	230,828.89	2,179,870.11
15	Kulekhanil	60	5,479.90	3,604.30	4,370.50	3,581.30	4,859.60	8,878.10	12,080.50	13,805.90	15,730.10	13,236.10	7,264.90	5,013.60	97,904.80
16	Kulekhanill	32	2,556.19	1,571.01	1,838.05	1,575.50	2,414.46	4,358.71	5,343.86	6,598.65	7,606.30	6,146.60	3,514.37	2,338.15	45,861.85
	B.TotalStorage	92	8,036.09	5,175.31	6,208.55	5,156.80	7,274.06	13,236.81	17,424.36	20,404.55	23,336.40	19,382.70	10,779.27	7,351.75	143,766.65
	GrandTotal(A+B)	468.79	229,887.33	235,145.56	235,240.96	222,194.11	204,057.49	165,566.25	136,176.53	119,020.25	137,251.04	168,343.80	232,572.80	238,180.64	2,323,636.75







## ACTUAL GENERATION FOR THE FY 2074/75 (FY 2017/18A.D.)

S.No.	Power Stations/ Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
1	Kaligandaki 'A'	KGA	101,725.00	101,928.00	102,818.00	92,307.00	64,444.00	48,791.00	41,121.00	36,950.00	40,748.00	82,633.00	101,359.00	865,075.00
2	Mid-Marsyangdi	MMHPS	51,182.13	51,020.62	50,314.75	44,467.37	31,968.76	24,708.74	20,006.26	14,860.37	21,243.75	47,447.87	52,800.00	437,286.87
3	Marsyangdi	MHPS	45,329.20	45,978.30	48,568.00	46,168.50	35,988.50	28,317.70	23,420.80	21,454.80	24,396.60	48,696.90	47,202.20	447,490.30
4	Kulekhani I	KLI	860.00	313.00	202.00	225.00	202.00	4,345.00	5,283.00	14,322.00	12,845.00	6,428.00	4,437.00	62,131.00
5	Kulekhani II	KLI	526.50	185.20	236.90	266.30	280.40	2,350.20	2,727.40	7,151.20	6,523.10	3,051.60	2,091.00	31,754.10
6	Chameliya	CHMPS	-	-	-	-	-	-	5,856.48	5,343.07	7,261.59	12,292.57	12,739.74	52,459.58
7	Trishuli	THPS	10,953.50	9,649.00	10,999.80	12,007.90	11,326.50	9,556.30	8,501.50	8,418.30	9,115.70	10,528.00	10,387.00	121,316.50
8	Gandak	GHPS	3,483.80	-	2,151.80	1,022.00	-	2,048.40	2,619.00	3,007.70	890.20	54.50	2,218.40	17,495.80
9	Modi	MKHPS	7,222.60	7,349.20	10,200.20	7,746.90	5,005.10	3,847.30	3,213.80	2,115.00	1,028.30	7,231.70	7,101.10	66,422.70
10	Devighat	DHPS	7,824.09	6,707.18	8,294.65	8,827.25	8,431.31	7,041.39	6,389.00	6,236.40	6,753.05	7,327.03	5,241.25	86,238.79
11	Sunkoshi	SKHPS	5,174.90	5,271.40	5,895.00	6,618.70	4,728.80	4,197.90	3,574.40	3,137.20	2,783.20	4,736.30	5,684.60	55,050.50
12	Puwa	PKHPS	3,883.74	4,234.64	4,224.08	4,231.79	2,488.99	1,833.45	1,347.65	1,430.18	1,432.73	3,871.75	4,371.35	35,790.53
13	Chatara	CHPS	-	-	-	-	-	22.25	-	-	-	-	-	22.25
14	Panauti	PHPS	-	-	32.42	-	103.33	200.81	89.59	70.49	100.63	153.45	241.26	1,112.34
15	Seti	SHPS	969.75	918.81	1,019.61	975.60	877.59	421.47	897.84	823.05	883.62	702.09	811.08	10,186.74
16	Fewa	FHPS	197.55	214.59	243.39	130.34	223.82	250.41	237.35	219.53	102.27	-	92.43	1,911.68
17	Sundarijal	SJHPS	498.00	466.66	406.00	389.33	444.33	369.66	284.66	235.33	221.00	306.66	486.00	4,332.29
18	Pharping		-	-	-	-	-	-	-	-	-	-	-	-
	Total (Hydro)		239,830.75	234,236.60	245,606.59	225,383.98	166,513.43	138,301.98	125,569.73	125,774.62	136,328.74	235,461.42	257,263.40	2,296,076.97
19	Multifuel	MFPS	-	-	-	4.20	1.05	2.15	6.20	1.10	1.08	-	-	15.78
20	Hetauda Diesel	HDPS	5.93	5.44	7.02	29.63	12.17	9.08	8.36	7.55	8.42	9.26	12.07	127.19
	Total (Thermal)		5.93	5.44	7.02	33.83	13.22	11.23	14.56	8.65	9.49	9.26	12.07	142.96
	Grand Total		239,836.68	234,242.05	245,613.61	225,417.81	166,526.65	138,313.21	125,584.30	125,783.27	136,338.23	235,470.68	257,275.47	2,296,219.93

## Generation Operation and Maintenance

Generation Declaration/ Forecast for the FY 2075/76 (FY 2018/19 A.D (Revised )

S.N	Power Stations	Installed Capacity (MW)	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
1	Kaligandaki A	144	96,264.94	97,004.15	61,637.85	66,994.29	73,657.55	55,349.64	43,851.44	42,382.01	47,679.66	60,467.79	85,854.18	94,108.54	825,252.04
2	Middle Marsyangdi	70	50,512.29	49,868.31	49,274.11	45,310.11	34,611.55	26,212.00	19,658.30	18,415.15	22,779.70	30,934.41	46,076.20	51,263.28	444,915.41
3	Marsyangdi	69	47,434.63	47,148.08	47,765.34	47,627.68	41,880.86	31,867.94	25,010.08	23,490.78	26,986.72	35,257.45	48,461.93	48,378.15	471,309.63
4	Chameliya	30	21,570.00	21,225.00	21,225.00	19,110.00	14,285.00	10,695.00	8,445.00	7,875.00	9,005.00	11,970.00	17,570.00	21,225.00	184,200.00
5	Trisuli	24	12,426.91	11,916.96	12,386.15	12,961.83	12,565.77	11,073.60	9,466.56	9,053.25	9,735.45	11,381.28	12,395.09	12,250.82	137,613.64
6	Devighat	15	6,726.34	8,228.76	8,043.49	8,202.42	8,607.00	7,598.20	7,402.17	7,285.98	7,576.80	6,963.95	8,822.84	7,737.52	93,195.47
7	Gandak	15	4,096.73	3,050.80	3,882.79	2,502.37	1,748.93	3,382.36	3,110.75	2,872.05	1,715.14	1,124.65	2,135.03	3,738.60	33,360.19
8	Modi Khola	14.8	6,425.91	7,488.40	9,717.84	8,397.84	5,349.65	4,019.71	3,107.51	2,800.48	3,226.38	4,875.19	8,216.00	7,346.58	70,971.48
9	Sunkoshi	10.05	5,863.00	5,792.32	5,918.30	6,337.54	5,309.29	4,301.09	3,504.43	3,082.54	3,283.51	3,811.67	5,188.00	5,796.31	58,188.00
10	Ilam (Puwa Khola)	6.2	4,221.37	4,293.00	4,191.53	4,255.81	2,764.53	1,930.86	1,473.79	1,568.76	1,511.98	2,043.59	3,543.31	4,255.01	36,053.52
11	Chatara	3.2	-	345.61	599.84	346.33	266.96	252.75	157.95	187.45	180.56	268.65	411.44	528.86	3,546.40
12	Panauti	2.4	351.85	442.54	461.68	365.86	315.57	296.83	181.32	153.03	137.43	166.26	207.10	321.30	3,400.78
13	Seti	1.5	898.71	864.75	957.08	943.50	934.56	791.55	897.83	855.26	901.67	876.52	814.37	828.45	10,564.25
14	Fewa	1	230.55	236.08	255.63	251.36	322.89	365.74	305.73	280.26	183.90	124.07	175.74	258.40	2,990.36
15	Sundarjal	0.64	467.21	459.95	450.50	445.47	259.02	230.40	222.72	230.40	230.40	238.08	343.05	456.63	4,033.83
A. TOTAL ROR		406.79	259,529.29	258,364.70	261,538.03	247,029.46	203,768.08	159,604.47	126,904.20	120,598.25	135,566.58	171,826.65	240,214.27	258,493.45	2,379,594.99
16	Kulekhani I	60	6,647.33	4,722.33	5,375.67	4,591.53	5,931.20	11,074.87	13,744.73	14,766.73	15,111.53	13,058.47	7,547.07	5,983.27	108,554.73
17	Kulekhani II	32	2,871.40	1,885.95	2,165.35	1,918.13	2,708.46	5,150.84	6,105.53	6,921.41	7,087.35	5,919.46	3,429.91	2,527.20	48,690.99
B. Total Storage		92	9,518.73	6,608.28	7,541.02	6,509.66	8,639.66	16,225.71	19,850.26	21,688.15	22,198.89	18,977.92	10,976.98	8,510.47	157,245.73
Grand Total (A+B)		498.79	269,048.02	264,972.98	269,079.05	253,539.12	212,407.74	175,830.18	146,754.46	142,286.39	157,765.46	190,804.57	251,191.24	267,003.92	2,536,840.72





## ACTUAL GENERATION FOR THE FY 2075/76 (FY 2018/19A.D.)

S.No.	Power Stations/ Month	Shrawan	Bhadra	Ashwin	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jestha	Ashad	Total
1	Kaligandaki 'A'	100,902.00	98,017.00	65,650.00	67,913.00	63,726.00	48,224.00	43,580.00	44,728.00	55,593.00	88,709.00	99,146.00	95,726.00	871,914.00
2	Mid-Marsyangdi	50,830.13	49,500.13	51,614.00	44,704.70	32,082.20	24,471.60	21,058.00	22,842.30	29,473.10	48,551.10	49,417.50	46,777.75	471,322.51
3	Marsyangdi	45,197.20	44,981.20	48,936.50	46,863.20	36,038.30	27,926.50	25,314.00	24,811.50	31,695.80	47,422.20	52,096.70	43,892.90	475,176.00
4	Kulekhani I	4,480.00	2,894.00	2,209.00	1,349.00	2,249.00	5,878.00	5,390.00	2,710.00	13,504.00	20,932.00	16,616.00	12,973.00	91,184.00
5	Kulekhani II	2,094.00	1,370.50	1,054.30	701.40	1,156.30	3,030.20	2,753.90	1,359.80	6,440.90	10,043.00	8,124.60	6,547.80	44,676.70
6	Chameluya	9,579.47	13,272.40	21,010.62	15,820.60	10,862.10	8,507.10	6,609.75	7,861.39	12,686.36	18,363.55	17,908.78	18,913.42	161,395.54
7	Trishuli	8,735.50	11,158.70	10,446.10	10,652.50	11,178.70	9,867.80	10,069.00	9,732.50	9,840.00	9,044.10	11,487.60	11,528.60	123,741.10
8	Gandak	1,899.70	1,599.90	1,659.80	213.50	-	1,616.40	869.90	1,703.00	732.20	-	479.50	1,176.90	11,950.80
9	Modi	6,027.50	7,106.70	9,937.50	6,801.60	4,749.20	3,343.10	2,656.90	2,660.90	3,807.80	6,907.60	8,286.70	7,115.00	69,400.50
10	Devighat	6,024.84	7,558.92	7,294.98	7,844.55	6,268.39	7,362.30	7,371.98	7,076.75	7,226.96	6,523.64	8,302.23	7,995.60	86,851.14
11	Sunkoshi	4,488.20	5,146.30	6,450.80	6,934.40	5,114.40	4,093.70	3,305.50	3,316.70	3,864.90	6,044.20	7,114.30	6,283.30	62,156.70
12	Puwa	4,412.66	3,859.84	4,357.75	3,747.97	2,317.63	1,862.38	1,433.26	1,834.42	1,948.12	2,565.89	2,517.80	3,335.09	34,192.81
13	Chatara	-	-	73.75	447.75	354.25	362.25	289.50	223.50	212.00	115.25	421.25	198.75	2,698.25
14	Panauti	432.49	464.00	504.66	361.89	262.05	214.08	176.54	163.79	129.06	173.17	30.21	93.91	3,005.84
15	Seti	927.27	904.77	924.30	885.33	806.22	922.86	815.00	761.80	802.30	909.81	708.39	661.95	10,030.00
16	Fewa	107.05	157.01	234.24	67.96	89.09	39.28	190.00	223.80	209.30	115.53	-	98.42	1,531.68
17	Sundarjal	470.33	468.99	453.66	382.00	231.33	240.00	229.66	226.33	209.67	215.67	211.67	248.00	3,587.30
18	Pharapung	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Upper Trishuli 3A project	-	-	-	-	-	-	-	-	-	-	3,348.00	12,837.60	16,185.60
	Total (Hydro)	246,608.34	248,460.36	232,811.96	215,691.34	177,485.16	147,961.55	132,112.89	132,236.48	178,375.47	266,635.70	286,217.22	276,403.98	2,541,000.46
20	Multifuel	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Hetauda Diesel	7.25	9.71	9.95	9.37	10.20	10.73	11.85	8.59	11.23	10.38	8.65	7.84	115.74
	Total (Thermal)	7.25	9.71	9.95	9.37	10.20	10.73	11.85	8.59	11.23	10.38	8.65	7.84	115.74
	Grand Total	246,615.59	248,470.07	232,821.91	215,700.71	177,495.36	147,972.28	132,124.74	132,245.06	178,386.70	266,646.08	286,225.88	276,411.83	2,541,116.21

Note:

## Generation Operation and Maintenance

Energy Utilization and NEA owned Power House Station Loss for the FY 2075/76 (FY 2018/19 A.D.)

S.No.	Power Stations	Generation (MWh)	Backfeed (MWh)	Available Energy (MWh)	Station and/or Internal Consumption (MWh)	Local Distribution (MWh)	Grid Transmission (MWh)	Net Grid Transmission (MWh)	Utilized Energy (MWh)	Station Loss
		A	B	C=A+B	D	E	F	G=F-B	H=D+E+F	J=(C-H)/C
1	Kaligandaki 'A'	871,914.00	200,084.00	1,071,998.00	1,807.26	935.32	1,068,925.015	868,841.02	1,071,667.60	0.03%
2	Mid-Marsyangdi	471,322.51	362,123.34	833,445.85	1,215.90	120.98	820,518.93	458,395.59	821,855.81	1.39%
3	Marsyangdi	475,176.00	209,667.00	684,843.00	3,791.40	-	664,214.40	454,547.40	668,005.80	2.46%
4	Kulekhani I	91,184.00	95,900.07	187,084.07	479.98	8,204.73	178,372.77	82,472.71	187,057.48	0.01%
5	Kulekhani II	44,676.70	460.39	45,137.09	210.83	-	44,475.96	44,015.57	44,686.79	1.00%
6	Chameluya	161,395.54	34,964.54	196,360.08	128.10	1,096.30	193,404.50	158,439.97	194,628.90	0.88%
7	Trishuli	123,741.10	172,411.57	296,152.67	232.69	24,217.83	268,994.48	96,582.91	293,445.00	0.91%
8	Gandak	11,950.80	125,126.83	137,077.63	670.09	82,329.79	53,359.75	(71,767.08)	136,359.63	0.52%
9	Modi	69,400.50	82,513.00	151,913.50	560.19	5,469.60	145,122.26	62,609.26	151,152.04	0.50%
10	Devighat	86,851.14	46,966.90	133,818.04	156.00	31,041.86	102,232.00	55,265.10	133,429.86	0.29%
11	Sunkoshi	62,156.70	2,168.14	64,324.84	256.01	1,907.60	61,930.23	59,762.09	64,093.84	0.36%
12	Puwa	34,192.81	131.89	34,324.70	44.89	-	34,152.13	34,020.24	34,197.02	0.37%
13	Chatara	2,698.25	1,418.63	4,116.88	15.22	1,369.34	2,663.00	1,244.37	4,047.55	1.68%
14	Panauli	3,005.84	-	3,005.84	20.46	-	2,985.41	2,985.41	3,005.87	*
15	Seti	10,030.00	1.00	10,031.00	38.99	-	9,302.38	9,301.38	9,341.37	6.87%
16	Fewa	1,531.68	-	1,531.68	18.69	-	-	-	18.69	*
17	Sundarijal	3,587.30	-	3,587.30	6.97	-	3,580.33	3,580.33	3,587.30	*
18	Upper Trishuli 3A Project	16,185.60	-	16,185.60	9.66	-	16,023.74	16,023.74	16,033.40	0.94%
	Total (Hydro)	2,541,000.46	1,333,937.29	3,874,937.76	9,663.31	156,693.35	3,670,257.29	2,336,320.00	3,836,613.95	0.99%
19	Multifuel	-	-	-	-	-	-	-	-	-
20	Hetauda Diesel	115.74	-	115.74	11.01	-	105.47	105.47	116.48	*
	Total (Thermal)	115.74	-	115.74	11.01	-	105.47	105.47	116.48	-
	Grand Total	2,541,116.21	1,333,937.29	3,875,053.50	9,674.32	156,693.35	3,670,362.76	2,336,425.47	3,836,730.43	0.99%

Note: Provisional figures subjected to final audit







## NEPAL ELECTRICITY AUTHORITY

## Generation Operation and Maintenance

Generation Related Statistics and Performance Factors for the FY 2075/76 (FY 2018/019)

S. No.	Power Stations	Total Installed Capacity (MW)	Total No. of Units Installed	Actual Generation (MWh)			Maximum Generation in a year till date/year (MWh)	Design Generation (MWh)	Generation Target (MWh)	
				FY 2073/74	FY 2074/75	* FY 2075/76 (A)				
1	Kaligandaki 'A'	144.00	3	842,149.00	865,075.00	871,914.00	929,983.00 (2071/72)	842,000.00	825,252.04	
2	Middle Marsyangdi	70.00	2	454,651.62	437,286.87	471,322.51	471,322.51 (2075/76)	398,000.00	444,915.41	
3	Marsyangdi	69.00	3	465,305.50	447,490.30	475,176.00	483,928.20 (2052/53)	462,500.00	471,309.63	
4	Kulekhani-I	60.00	2	73,402.00	62,131.00	91,184.00	249,680.00 (2056/57)	211,000.00	108,554.73	
5	Kulekhani-II	32.00	2	37,795.13	31,754.10	44,676.70	122,757.00 (2056/57)	104,600.00	48,690.99	
6	Chameliya	30.00	2	-	52,459.58	161,395.54	161,395.54(2075/76)	184,200.00	184,200.00	
6	Trishuli	24.00	7	125,969.40	121,316.50	123,741.10	154,423.75 (2053/54)	163,000.00	137,613.64	
7	Gandak	15.00	3	21,872.70	17,495.80	11,950.80	52,272.70 (2043/44)	106,380.00	33,360.19	
8	Modi Khola	14.80	2	69,556.40	66,422.70	69,400.50	69,556.40 (2073/74)	92,500.00	70,971.48	
9	Devighat	15.00	3	97,609.96	86,238.79	86,851.14	106,277.70 (2056/57)	114,000.00	93,195.47	
10	Sunkoshi	10.05	3	46,190.70	55,050.50	62,156.70	66,383.10 (2068/69)	70,000.00	58,188.00	
11	Ilam (Puwa Khola)	6.20	2	36,414.24	35,790.53	34,192.81	36,414.24 (2073/74)	48,000.00	36,053.52	
12	Chatara	3.20	2	-	22.25	2,698.25	5,219.75 (2063/64)	6,000.00	3,546.40	
13	Panaufi	2.40	3	2,603.33	1,112.34	3,005.84	4,654.80 (2058/59)	6,970.00	3,400.78	
14	Seti	1.50	3	8,044.86	10,186.74	10,030.00	11,616.19 (2067/68)	9,800.00	10,564.25	
15	Fewa	1.00	4	1,467.69	1,911.68	1,531.68	3,919.47 (2034/35)	6,500.00	2,990.36	
16	Sundarijal	0.64	2	4,490.73	4,332.29	3,587.30	4,530.26 (2071/72)	4,770.00	4,033.83	
17	Pharping	0.50	2	0.88	-	-	48.65(2064/65)	-	-	
18	Upper Trishuli 3A project	60.00	2	-	-	16,185.60	16185.60(2075/76)	489,760.00	-	
	Total (Hydro)	559.29	52	2,287,524.14	2,296,076.97	2,541,000.46	-	3,319,980.00	2,536,840.72	
19	Multifuel	39.00	6	26.66	15.78	-	86,215.07 (2055/56)	-	-	
20	Hetauda Diesel	14.41	4+3	325.98	127.19	115.74	24,203.64 (2055/56)	-	-	
	Total (Thermal)	53.41	13	352.64	142.96	115.74	-	-	-	
	Grand Total	612.70	65	2,287,876.78	2,296,219.93	2,541,116.20	-	3,319,980.00	2,536,840.72	

**Note :**

Above Generation Energy Datas were excluding NEA owned Small Power Houses

'#Metering Problem

Total Generation Energy of NEA owned Power Stationsincluding Small Hydro Power Houses = 2548.11 GWh

Total Available Energy of the System = 7551.23 GWh

Overall Generation Loss: 0.507 % ((C-G)/Total Available Energy of the system)



	Backfeed (MWh) (B)	Available NEA Power Station Energy (C=A+B)	Transmission to Grid (MWh) (D)	Local Distribution (MWh) (E)	Station and/ or Internal Consumption (MWh)(F)	NEA Power Stations Utilized Energy (G = D+E+F )	Power Station Loss (%) (C-G) / (c)	Self Sufficiency Ratio (%) (D+E) / (C)	Plant Factor (%) (A / (Ins. Capacity *356 *24) *100)	Current No. of Employees
	200,084.00	1,071,998.00	1,068,925.02	935.32	1,807.26	1,071,667.60	0.03%	99.80%	69.12	91
	362,123.34	833,445.85	820,518.93	120.98	1,215.90	821,855.81	1.39%	98.46%	76.86	72
	209,667.00	684,843.00	664,214.40	-	3,791.40	668,005.80	2.46%	96.99%	78.61	60
	95,900.07	187,084.07	178,372.77	8,204.73	479.98	187,057.48	0.01%	99.73%	17.35	69
	460.39	45,137.09	44,475.96	-	210.83	44,686.79	1.00%	98.54%	15.94	44
	34964.54	196,360.08	193,404.50	1,096.30	128.10	194,628.90	0.88%	99.05%	61.41	29
	172,411.57	296,152.67	268,994.48	24,217.83	232.69	293,445.00	0.91%	99.01%	58.86	55
	125,126.83	137,077.63	53,359.75	82,329.79	670.09	136,359.63	0.52%	98.99%	9.09	32
	82,513.00	151,913.50	145,122.26	5,469.60	560.19	151,152.04	0.50%	99.13%	53.53	40
	46,966.90	133,818.04	102,232.00	31,041.86	156.00	133,429.86	0.29%	99.59%	66.10	37
	2,168.14	64,324.84	61,930.23	1,907.60	256.01	64,093.84	0.36%	99.24%	70.60	45
	131.89	34,324.70	34,152.13	-	44.89	34,197.02	0.37%	99.50%	62.96	37
	1,418.63	4,116.88	2,663.00	1,369.34	15.22	4,047.56	1.68%	97.95%	9.63	24
	-	3,005.84	2,985.41	-	20.46	3,005.87	#	99.32%	14.30	26
	1.00	10,031.00	9,302.38	-	38.99	9,341.37	6.87%	92.74%	76.33	33
	-	1,531.68	-	-	18.69	18.69	#	#	17.48	
	-	3,587.30	3,580.33	-	6.97	3,587.30	#	99.81%	63.99	18
	-	-	-	-	-	-	-	-	-	4
	-	16,185.60	16,023.74	-	9.66	16,033.40	0.94%	99.00%	3.08	59
	1,333,937.30	3,874,937.76	3,670,257.29	156,693.35	9,663.31	3,836,613.95	0.99%	98.76%	51.86	775
	-	-	-	-	-	-	-	-	-	19
	-	-	105.47	-	11.01	116.48	#	91.13%	0.09	16
	0.00	0.00	105.47	-	11.01	116.48	#	91.13%	0.02	35
	1,333,937.30	3,875,053.50	3,670,362.76	156,693.35	9,674.32	3,836,730.43	0.99%	98.76%	47.34	810



## Generation Operation and Maintenance

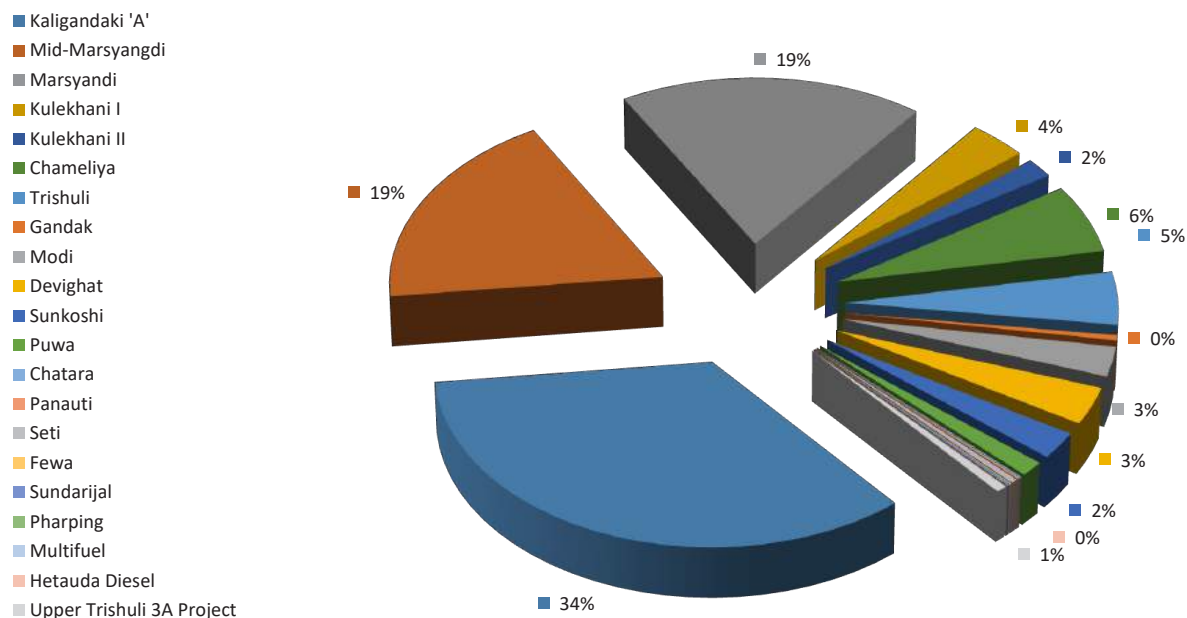
Operation and Generation Cost for the Fiscal Year 2075/76 (2018/19)

S.N.	HPS	Total Installed Capacity (MW)	Generation (MWh)	Fixed Assets (Rs)	O & M Expenditure (Rs)	Royalty (Rs)	Depreciation (Rs)	Total Cost (Rs)	Operation Cost (Rs/Unit)	Generation Cost (Rs./Unit)
A	B	C	D	E	F	G	H	I=F+G+H	J = F/D	K = I/D
1	Kaligandaki A HPS	144.00	871,914.00	25,309,732.86	794,350.56	614,727.75	561,626.69	1,970,704.99	0.91	2.26
2	Middle Marsyangdi HPS	70.00	471,322.51	28,698,298.35	547,362.76	57,885.54	810,354.22	1,415,602.52	1.16	3.00
3	Marsyangdi HPS	69.00	475,176.00	6,211,313.71	127,734.00	324,019.07	137,951.25	589,704.32	0.27	1.24
4	Kulekhani I HPS	60.00	91,184.00	2,833,655.46	193,878.47	109,070.87	57,303.87	360,253.21	2.13	3.95
5	Kulekhani II HPS	32.00	44,676.70	910,780.93	94,001.14	56,056.04	20,310.07	170,367.24	2.10	3.81
6	Chameliya HPS	30.00	161,395.54	14,599,678.98	45,197.06	20,449.14	321,269.35	386,915.55	0.28	2.40
7	Trishuli HPS	24.00	123,741.10	1,893,288.36	226,730.06	90,818.05	45,966.99	363,515.10	1.83	2.94
8	Gandak HPS	15.00	11,950.80	297,432.93	58,052.03	21,102.86	5,577.27	84,732.16	4.86	7.09
9	Modikhola HPS	14.80	69,400.50	2,172,730.09	61,059.56	52,042.61	59,749.08	172,851.25	0.88	2.49
10	Devighat HPS	15.00	86,851.14	1,314,580.57	147,638.76	61,002.07	35,032.23	243,673.07	1.70	2.81
11	Sunkoshi HPS	10.05	62,156.70	357,508.92	129,837.94	43,538.27	13,110.27	186,486.48	2.09	3.00
12	Ilam (Puwakhola) HPS	6.20	34,192.81	1,076,716.19	96,419.12	24,674.02	251.19	121,344.33	2.82	3.55
13	Chatara HPS	3.20	2,698.25	198,592.08	27,426.64	4,651.52	67,506.63	99,584.79	10.16	36.91
14	Panauti HPS	2.40	3,005.84	97,753.55	35,143.15	4,015.09	2,008.74	41,166.98	11.69	13.70
15	Setifewa HPS	2.50	11,561.68	45,612.56	1,604.92	8,811.66	48,767.43	59,184.02	0.14	5.12
16	Sundarjal HPS	0.64	3,587.30	3.42	17,146.48	-	0.11	17,146.59	4.78	4.78
17	Pharping HPS	0.50	-	0.19	4,002.82	-	-	4,002.82	-	-
18	Multifuel Plant	39.00	-	1,692,696.28	31,881.58	-	70,590.76	102,472.34	-	-
19	Hetauda Diesel Plant	14.41	115.74	80,172.42	31,738.96	-	1,856.52	33,595.48	274.23	290.27
Total		552.70	2,524,930.60	87,790,547.86	2,671,206.01	1,492,864.56	2,259,232.68	6,423,303.25	1.06	2.54

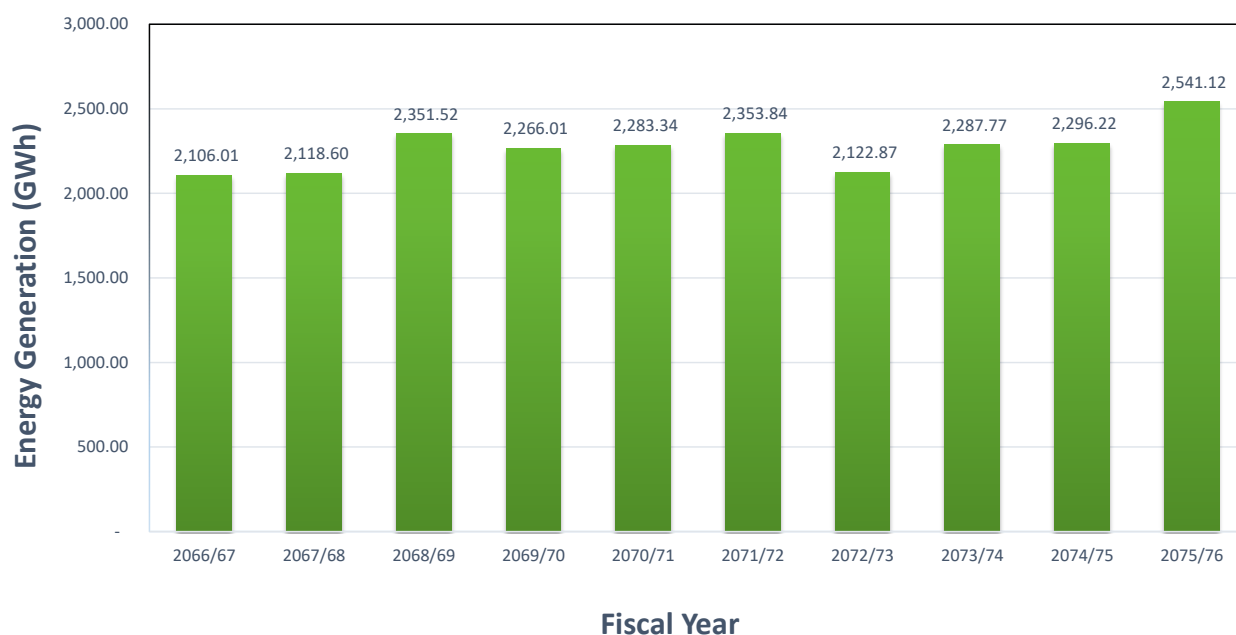
Source: Central Account, Central Payment Section, Account Division-Generation Directorate



## ACTUAL GENERATION FROM NEA OWNED POWER HOUSES OF FY 2075/76 (MWH)



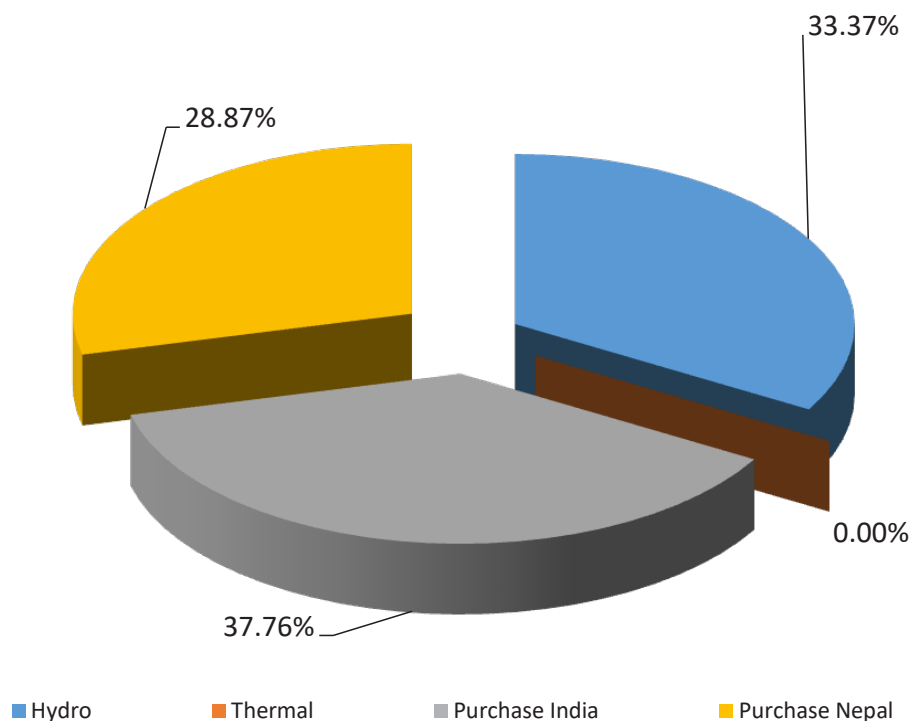
## GENERATION FROM NEA OWNED POWER HOUSES FROM LAST 10 YEARS (GWH)



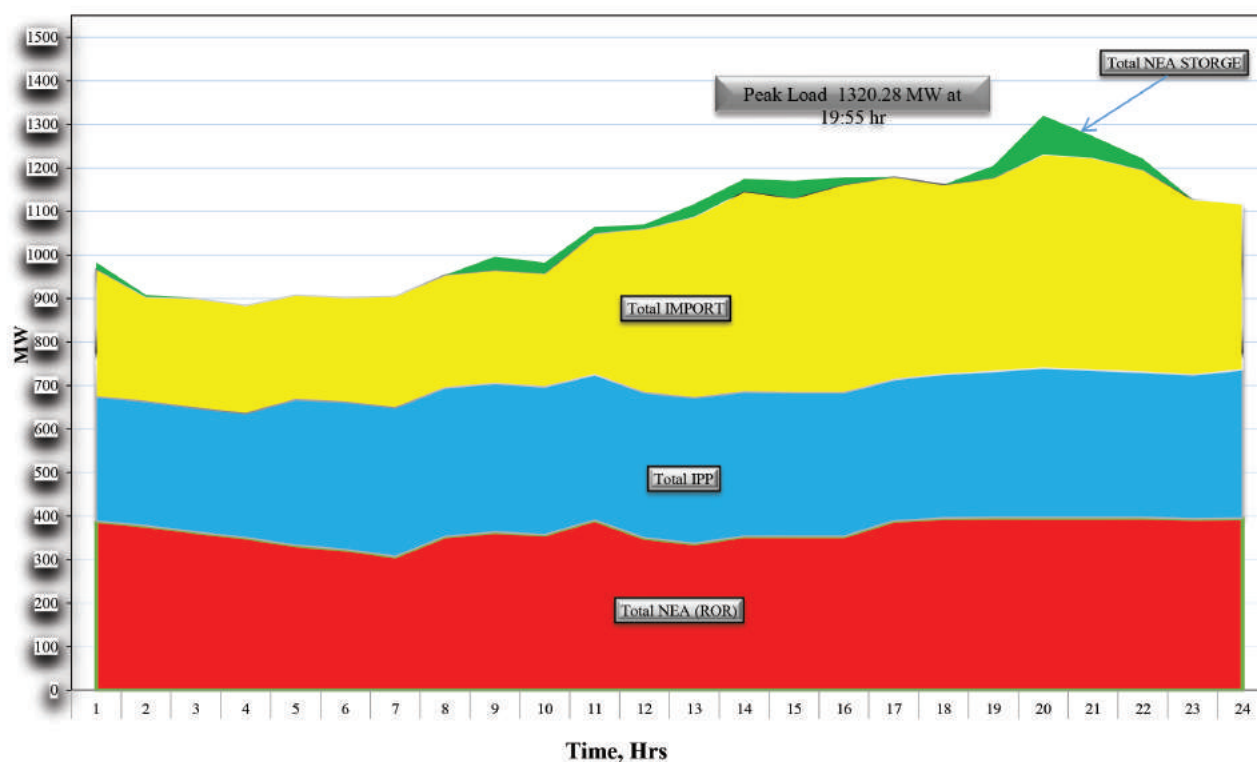




## AVAILABILITY OF ENERGY (FY 2075/76)



## LOAD DISPATCH CENTER SYSTEM LOAD CURVE, ASAR 15, 2076 (JUNE 30, 2019)



## IPPS' HYDRO POWER PROJECTS (OPERATION) OF NEPAL

S.N.	Developer	Projects	Location	Capacity (kW)	PPA Date	Commercial Operation Date	Total Energy Received (Including Excess Energy) ( MWh)	Non-Commercial Energy (MWh)
1	Himal Power Ltd.	Khimti Khola	Dolakha	60,000.00	2052.10.01	2057.03.27	375,514.90	
2	Bhotekoshi Power Company Ltd.	Upper Bhotekoshi	Sindhupalchowk	45,000.00	2053.04.06	2057.10.11	-	
3	Syange Electricity Company Limited	Syange Khola	Lamjung	183.00	2058.10.03	2058.10.10	1,053.69	
4	National Hydro Power Company Ltd.	Indrawati - III	Sindhupalchowk	7,500.00	2054.09.15	2059.06.21	39,511.28	
5	Chilime Hydro Power Company Ltd.	Chilime	Rasuwa	22,100.00	2054.03.11	2060.05.08	150,858.18	
6	Butwal Power Company Ltd.	Jhimruk Khola	Pyuthan	12,000.00	2058.03.29	1994	60,036.62	
7	Butwal Power Company Ltd.	Andhi Khola	Syangza	9,400.00	2058.03.29	2071.12.22	31,694.73	
8	Arun Valley Hydropower Development Co. (P) Ltd.	Piluwa Khola Small	Sankhuwasabha	3,000.00	2056.10.09	2060.06.01	14,238.00	
9	Rairang Hydro Power Development Co. (P) Ltd.	Rairang Khola	Dhading	500.00	2059.08.27	2061.08.01	1,316.68	
10	Sanima Hydropower (Pvt.) Ltd.	Sunkoshi Small	Sindhupalchowk	2,500.00	2058.07.28	2061.12.11	13,380.13	
11	Alliance Power Nepal Pvt.Ltd.	Chaku Khola	Sindhupalchowk	3,000.00	2056.11.03	2062.03.01	10,053.77	
12	Khudi Hydropower Ltd.	Khudi Khola	Lamjung	4,000.00	2058.03.04	2063.09.15	22,954.98	
13	Unique Hydel Co. Pvt.Ltd.	Baramchi Khola	Sindhupalchowk	4,200.00	2058.12.14	2063.09.27	8,710.49	
14	Thoppal Khola Hydro Power Co. Pvt. Ltd.	Thoppal Khola	Dhading	1,650.00	2059.11.23	2064.07.13	3,590.65	
15	Gautam Buddha Hydropower (Pvt.) Ltd.	Sisne Khola Small	Palpa	750.00	2061.04.29	2064.06.01	3,172.46	
16	Kathmandu Small Hydropower Systems Pvt. Ltd.	Sali Nadi	Kathmandu	250.00	2062.04.24	2064.08.01	564.56	
17	Khoranga Khola Hydropower Dev. Co. Pvt. Ltd.	PHEME Khola	Panchthar	995.00	2057.12.31	2064.08.05	4,339.59	
18	Unified Hydropower (P) Ltd.	Pati Khola Small	Parbat	996.00	2062.10.28	2065.10.27	4,312.90	
19	Task Hydropower Company (P) Ltd.	Seti-II	Kaski	979.00	2063.06.08	2065.11.14	5,893.22	
20	Ridi Hydropower Development Co. (P) Ltd.	Ridi Khola	Gulmi	2,400.00	2063.05.08	2066.07.10	9,440.17	
21	Centre for Power Dev. And Services (P) Ltd.	Upper Hadi Khola	Sindhupalchowk	991.00	2064.04.07	2066.07.22	885.91	
22	Gandaki Hydro Power Co. Pvt. Ltd.	Mardi Khola	Kaski	4,800.00	2060.07.07	2066.10.08	24,402.50	
23	Himal Dolkha HydropowerCompanyLtd.	Mai Khola	Ilam	4,500.00	2063.11.19	2067.10.14	13,961.87	
24	Baneswor Hydropower Pvt. Ltd.	Lower Piluwa Small	Sankhuwasabha	990.00	2064.07.21	2068.04.01	3,119.00	
25	Barun Hydropower Development Co. (P) Ltd.	Hewa Khola	Sankhuwasabha	4,455.00	2061.04.02	2068.04.17	18,686.53	
26	Bhagawati Hydropower Development Co. (P) Ltd.	Bijayapur-1	Kaski	4,410.00	2066.03.30	2069.05.04	24,928.18	
27	Kathmandu Upatyaka Khanepani bewasthapan Board	Solar	Lalitpur	680.40	2069.06.12	2069.07.15	600.97	
28	Nyadi Group (P) Ltd.	Siuri Khola	Lamjung	4,950.00	2064.04.17	2069.07.30	23,288.82	
29	United Modi Hydropwer Pvt. Ltd.	Lower Modi 1	Parbat	10,000.00	2065.10.20	2069.08.10	50,562.56	
30	Synergy Power Development (P) Ltd.	Spring Khola	Dolakha	9,658.00	2065.10.20	2069.10.03	24,023.60	
31	Laughing Buddha Power Nepal (P) Ltd.	Middle Chaku	Sindhupalchowk	1,800.00	2066.11.03	2069.11.15	4,899.89	
32	Aadishakti Power Dev. Company (P) Ltd.	Tadi Khola (Thaprek)	Nuwakot	5,000.00	2061.12.15	2069.12.14	18,929.70	



## IPPS' HYDRO POWER PROJECTS (OPERATION) OF NEPAL

S.N.	Developer	Projects	Location	Capacity (kW)	PPA Date	Commercial Operation Date	Total Energy Received (Including Excess Energy) ( MWh)	Non-Commercial Energy (MWh)
33	Ankhu Khola Jal Bidhyut Co. (P) Ltd.	Ankhu Khola - 1	Dhading	8,400.00	2066.02.22	2070.05.05	33,071.10	
34	Nepal Hydro Developer Pvt. Ltd.	Charanawati Khola	Dolakha	3,520.00	2067.01.13	2070.02.24	14,289.76	
35	Laughing Buddha Power Nepal Pvt. Ltd.	Lower Chaku Khola	Sindhupalchowk	1,800.00	2063.07.02	2070.04.24	4,612.24	
36	Bhairabkunda Hydropower Pvt. Ltd.	Bhairab Kunda	Sindhupalchowk	3,000.00	2065.08.02	2071.02.22	4,994.32	
37	Radhi Bidyut Company Ltd.	Radhi Khola	Lamjung	4,400.00	2066.10.18	2071.02.31	22,761.04	
38	Pashupati Environmental Eng. Power Co. Pvt. Ltd.	Chhote Khola	Gorkha	993.00	2067.11.09	2071.03.09	2,376.44	
39	Mailung Khola Hydro Power Company (P) Ltd.	Mailung Khola	Rasuwa	5,000.00	2058.04.09	2071.03.19	25,609.14	
40	Joshi Hydropower Development Company Limited	Upper Pawa - 1	Ilam	3,000.00	2066.01.23	2071.10.01	4,090.57	
41	Sanima Mai Hydropower Limited	Mai Khola	Ilam	22,000.00	2067.01.08	2071.10.14	99,864.88	
42	Bojini Company Private Limited	Jiri Khola Small	Dolakha	2,200.00	2065.10.23	2071.11.01	1,108.74	
43	Ruru Hydropower Project (P) Ltd.	Upper Hugdi Khola	Gulmi	5,000.00	2066.04.04	2071.12.09	20,778.78	
44	Prime Hydropower Co. Pvt. Ltd.	Belkhu	Dhading	518.00	2064.04.04	2071.12.30	1,699.28	
45	Api Power Company Pvt. Ltd.	Naugadh gad Khola	Darchula	8,500.00	2067.01.19	2072.05.02	34,779.25	
46	Kutheli Bukhari Small Hydropower (P) Ltd.	Suspa Bukhari	Dolakha	998.00	2069.04.32	2072.06.03	4,535.61	
47	Sanima Mai Hydropower Ltd.	Mai Cascade	Ilam	7,000.00	2069.10.12	2072.10.29	30,480.24	
48	Chhyangdi Hydropower Limited	Chhandi	Lamjung	2,000.00	2068.12.23	2072.12.13	9,006.86	
49	Panchakanya Mai Hydropower Ltd. (Previously Mai Valley and prior to that East Nepal)	Upper Mai Khola	Ilam	9,980.00	2061.12.19	2073.03.09	35,485.56	
50	Sayapatri Hydropower Private Limited	Daram Khola A	Baglung	2,500.00	2068.12.19	2073.03.12	8,080.37	
51	Electro-com and Research Centre Pvt. Ltd.	Jhyadi Khola	Sindhupalchowk	2,000.00	2067.01.30	2073.05.31	3,639.87	
52	Khani Khola Hydropower Company Pvt. Ltd.	Tungun-Thosne	Lalitpur	4,360.00	2069.04.05	2073.07.09	7,273.65	
53	Daraudi Kalika Hydro Pvt. Ltd.	Daraudi Khola A	Gorkha	6,000.00	2068.05.19	2073.08.13	31,194.91	
54	Khani Khola Hydropower Company Pvt. Ltd.	Khani Khola	Lalitpur	2,000.00	2069.04.05	2073.08.20	3,176.01	
55	Sapsu Kalika Hydropower Co. Pvt. Ltd.	Miya Khola	Khotang	996.00	2069.08.10	2073.09.03	3,868.58	
56	Sinohydro-Sagarmatha Power Company (P) Ltd.	Upper Marsyangdi "A"	Lamjung	50,000.00	2067.09.14	2073.09.17	360,174.79	
57	Madi Power Pvt. Ltd.	Upper Madi	Kaski	25,000.00	2066.05.21	2073.09.25	114,817.75	
58	Panchthar Power Company Pvt. Ltd.	Hewa Khola A	Panchthar	14,900.00	2068.05.30	2073.10.22	43,459.82	
59	Sanvi Energy pvt. Ltd.	Jogmai	Ilam	7,600.00	2069.08.07	2074.01.18	32,603.33	

## IPPS' HYDRO POWER PROJECTS (OPERATION) OF NEPAL

S.N.	Developer	Projects	Location	Capacity (kW)	PPA Date	Commercial Operation Date	Total Energy Received (Including Excess Energy) ( MWh)	Non-Commercial Energy (MWh)
60	Bhugol Energy Dev Compay (P). Ltd	Dwari Khola	Dailekh	3,750.00	2069.12.30	2074.01.23	7,865.61	
61	Mai Valley Hydropower Private Limited	Upper Mai C	Ilam	5,100.00	2068.12.23	2074.04.09	26,607.22	
62	Dronachal Hydropower Co.Pvt.Ltd	Dhunge-Jiri	Dolakha	600.00	2068.09.25	2074.06.01	111.39	
63	Dibyawsari Hydropower Limited	Sabha Khola	Sankhuwasabha	4,000.00	2068.11.17	2074.06.02	14,410.72	
64	Puwa Khola-1 Hydropower P. Ltd.	Puwa Khola -1	Ilam	4,000.00	2070.10.09	2074.06.23	14,361.92	
65	Shibani Hydropower Co. Pvt. Ltd.	Phawa Khola	Taplejung	4,950.00	2063.12.01	2074.07.14	11,168.80	
66	Mount Kailash Energy Pvt. Ltd.	Thapa Khola	Myagdi	13,600.00	2067.10.11	2074.08.22	11,589.95	
67	Mandakini Hydropower Limited	Sardi Khola	Kaski	4,000.00	2068.11.11	2074.08.23	16,698.90	
68	Gariang Upatyaka Hydropower (P) Ltd.	Chake Khola	Ramechhap	2,830.00	2065.11.06	2074.08.28	4,751.31	
69	Union Hydropower Pvt Ltd.	Midim Karapu	Lamjung	3,000.00	2069.10.28	2074.10.15	12,979.67	
70	Syauri Bhumei Microhydro Project	Syauri Bhumei	Nuwakot	23.00	2072.11.16	2074.10.18	130.55	
71	Molung Hydropower Company Pvt. Ltd.	Molung Khola	Okhaldhunga	7,000.00	2069.11.21	2074.12.12	19,396.96	
72	Sikles Hydropower Pvt. Ltd.	Madkyu Khola	Kaski	13,000.00	2066.08.03	2074.12.19	57,417.76	
73	Himal Dolkha HydropowerCompanyLtd.	Mai sana Cascade	Ilam	8,000.00	2069.11.14	2074.12.26	14,173.46	
74	Barahi Hydropower Pvt.Ltd	Theule Khola	Baglung	1,500.00	2066.12.16	2075.03.24	4,322.51	
75	Leguwa Khola Laghu Jalbidhyut Sahakari Sanstha Ltd.	Leguwa Khola	Dhankuta	40.00	2072.11.21	2075.03.28	171.43	
76	Super Mai Hydropower Pvt. Ltd.	Super Mai	Ilam	7,800.00	2073.12.06	2075.07.11	17,398.66	2,330.73
77	Chimal Gramin Bidhyut Sahakari Sanstha Ltd.	Sobuwa Khola-2 MHP	Taplejung	90.00	2074.11.15	2075.07.14	137.90	11.22
78	Surya Power Company Pvt. Ltd.	Bishnu Priya Solar Farm Project	Nawalparasi	960.00	2074.04.08	2075.08.13	35.71	71.08
79	Deurali Bahuadesiya Sahakari Sanstha Ltd.	Midim Khola	Lamjung	100.00	2070.02.20	2075.09.04	-	27.76
80	Bindhyabasini Hydropower Development Co. (P) Ltd.	Rudi Khola A	Lamjung and Kaski	8,800.00	2069.10.28	2075.12.04	9,086.85	791.78
81	Mandu Hydropower Ltd.	Bagmati Khola Small	Makawanpur/Lalitpur	22,000.00	2069.10.07	2075.12.19	13,916.08	2,573.73
82	EasternHydropower Pvt. Ltd.	Pikhuwa Khola	Bhojpur	5,000.00	2066.07.24	2076.02.27	-	607.37
83	Salmanidevi Hydropower (P). Ltd	Kapadi Gad	Doti	3,330.00	2069.12.11	2076.02.25	-	145.05
	Grand Total			560,775.40			2,183,492.77	6,558.72





## GENERATION DIRECTORATE

### Power Stations' contact details

S.No	Station	Station Chief	Contact No.	Mail Address
1	Kaligandaki "A" Hydropower Station	Rajesh Kumar Pandey	9856018144, 063-403081	kaligandaki@nea.org.np
2	Middle Marsyangdi Hydropower Station	Pashupati Raj Gautam	9856010073, 066-400073	mmhps@nea.org.np
3	Marsyangdi Hydropower Station	Badri Foyal	9841415433, 065-540088	marsyangdi@nea.org.np
4	Kulekhani -I Hydropower Station	Ram Kumar Yadav	9855075030, 057-410030	kulekhani1@nea.org.np
5	Kulekhani -II Hydropower Station	Avash Ojha	9855011545, 01-5198014	kulekhani2@nea.org.np
6	Chameliya Hydropower Station	Pradeep Singh	9841560795, 099-4930020	chameliya@nea.org.np
7	Multifuel Power Station	Sunil Kumar Chaturbedi	9852038322, 021-421243	multifuel@nea.org.np
8	Trishuli Hydropower Station	Tara Datt Bhatta	9851160992, 010-560099	trishuli@nea.org.np
9	Gandak Hydropower Station	Kapil Dev Manjan	9846256116, 078-520782	gandak@nea.org.np
10	Devighat Hydropower Station	Suraj Dahal	9851121095, 010-561095	devighat@nea.org.np
11	Hetauda Diesel Centre	Surendra Karki	9855077003, 057-520003	hetaudadiesel@nea.org.np
12	Sunkoshi Hydropower Station	Gir Bahadur K.C	9851208257, 011-482155	sunkoshi@nea.org.np
13	Modikhola Hydropower Station	Shiv Kumar Shah	9857690500, 067-410041	modikhola@nea.org.np
14	Puwakhola Hydropower Station	Prahlad Raut	9852620531, 027-520351	puwakhola@nea.org.np
15	Chatara Hydropower Station	Binod Prashad Pandey	9851062080, 025-550077	chatara@nea.org.np
16	Setifewa Hydropower Station	Harish Chandra Dhital	9856041245, 061-551245	setifewa@nea.org.np
17	Panauti Hydropower Station	Shiva Kumar Thapa	9851224809, 011-410056	panauti@nea.org.np
18	Sundarijal Hydropower Station	Mohammad Safid	9842636312, 01-4800806	sundarijal@nea.org.np
19	Farping Hydropower Station	Shyam Krishna Basnet	9841913700, 2113210	farping@nea.org.np

### Under Construction Hydro Power Projects

S.N.	Office Name	Designation	Name	Office Tel. No.	Email
1	Upper Trishuli 3'A" HPP	Project Chief	Fanendra Raj Joshi	010-560803	ut3ahep60mw@gmail.com
2	Kulikhani III HPP	Project Chief	Subash Kumar Mishra	057-621417	sbhnea@gmail.com



## CONTACT DETAILS OF GENERATION DIRECTORATE & DEPARTMENTS

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	Assistant Manager	Pramod Kumar Mishra	-	
	Engineer (Civil)	Ram Karki	-	ram.karki9993@gmail.com
	PA	Gauri Nath Shrestha	01-4153014 Ext - 1303	gaurinewa13@gmail.com
Large Generation O&M Department	Director	Madan Timsina	01-4153070 Ext : 5009	madantimsina@gmail.com
	Engineer (Mech.)	Chiranjibi Acharya	-	chiran.vsr@gmail.com
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Medium Generation O&M Department	Director	Chandra Sekhar Chaudhary	01-4153017 Ext- 3404	chaudharycs@yahoo.com
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	Engineer (Mech.)	Mahesh Bashyal	-	bashyalmahesh63@gmail.com
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	Director	Ajab Singh Mahara	fax: 4153047 Ext- 2303	mahara4@yahoo.com
	Manager	Arun Kumar Tiwari	-	arunktiwarinea@gmail.com
	Asst Manager	Binod Kumar Yadav		binodnea@gmail.com
Generation Development Department	Survey Officer	Rajan Manandhar		rajanman12345@gmail.com
	Director	Ram Gopal Siwakoti	01-4153028 / 01-4153029 Ext- 2201	rgsiwakoti@yahoo.com
Account Division	Deputy Director	Basanta Kumar Dhungana	01-4153170	aaisha4913@gmail.com
	Asst. Director	Laxmi Subedi	01-4153181	neagfd@gmail.com
	Acc Officer	Rajendra Thapa	01-4153181	neagfd@gmail.com
Administration Division	Deputy Director	Indira Devi Dahal	01- 4153172 Ext- 3002	indidahal@hotmail.com
	Adm Officer	Kamala Poudyal	Ext- 5031	
Monitoring & IT Section	Deputy Manager	Rabindra Shrestha	01-4153068	rbshrestha87@hotmail.com
	Asst. Manager	Rabin Shrestha	01-4153068	rabsht@gmail.com
	Supervisor(Ele.)	Utshav Adhikari	Ext-2105	utsav.adhikari@nea.org.np







Fig: Intake of Chameliya HPS.





Fig: MHPS Turbine Overhauling of Unit 2.





## Nepal Electricity Authority

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