

KAMENG HYDRO ELECTRIC PROJECT (600 MW)

Situated in West Kameng District of Arunachal Pradesh, the Kameng H.E. Project (600 MW) is a run-of-the river scheme which will utilize the flows from Bichom and Tenga Rivers (both tributaries of the River Kameng) over a gross head of 536 m available in downstream of the confluence of the River Bichom with Kameng. The Project comprises of two Nos of Dams viz. Bichom & Tenga and water is transported through a Head Race Tunnel (HRT) & HPT / Penstock into the Kimi Power House for driving 4 Nos. of Vertical Francis Turbines, 150 MW each. The design energy of the Project is 3353 MU in 90% dependable year with 95% Machine availability.

CCEA clearance of the Project was obtained in December 2004 at Rs. 2496.90 Crs. With a time of completion of 5 years. However owing to a range of factors, beyond the control of NEEPCO viz. major design change of primary structures, geological surprises, devastating flash floods, contractual issues, law and order problems etc., the commissioning of the Project has been delayed and now anticipated for commissioning in January 2018. Due to this time over-run, the Project Cost has also gone up and the Revised Cost Estimate (RCE) of the Project has been appraised at Rs. 6179.96 crs at March '15 PL by CEA.

KAMENG HYDRO ELECTRIC PROJECT (4 X 150)**Installed Capacity: 600 MW****Status: Construction****State: Arunachal Pradesh****Revised Scheduled of Commissioning: January 2018.**

General	
Location	Located in the West Kameng District of Arunachal Pradesh.
Rivers	Bichom River & Tenga River – Tributaries of River Brahmaputra
Type of Development	Run of River.
Hydrology	
90% dependable year	1976-77
Annual Inflow	3776.484 Mcum
Catchment Area	2277 Sq. Km. (Bichom) 1019 Sq. Km. (Tenga)
Land acquired	710 Ha
R&R Expenditure	38.39 Crs
CCEA Approval	
Cost of the Project	2 nd December 2004 Original: Rs. 2496.90 Crs. (Mar 2004 PL) RCE: Rs 6179.96 Crs (March 2015 PL)
Commissioning Schedule	Original: December 2009 Revised: January 2018.
Design Energy	3353 MU
Firm Power	163 MW
Tariff	Original: 1st year : Rs 1.48 per unit. Levelised : Rs. 1.23 per unit Revised: 1 st Year : Rs.4.46 Levellised: Rs 4.14 per unit.
PPA	Assam, Arunachal Pradesh, Nagaland, Haryana [Under finalization: States of Northern Region & Western Region]
Status of Award Packages:	
Package I, II & III – M/s Patel Engg.-Unity JV) Package- IV –M/s OMML & JSC – JV Package – V – M/s BHEL. Package – VI – M/s Techno Electric & Engineering Co. Ltd. Package – VII – M/s BHEL	
Salient Features	
Diversion Tunnel (M/s SEW & Coastal-JV	368.42 m
Dam	
Bichom Dam (Package I - M/s Patel Engg.-Unity JV)	
Type of Dam	Concrete Gravity Dam
LAT / LONG of Major Structures	Bichom Dam – Lat- 27°18'02.97"N / Long- 92°37'21.83"E Tenga Dam –Lat- 27°13'25.12"N / Long- 92°39'28.09"E Power House – Lat- 27°09'53.54" / Long- 92°40'57.40"E
Length / Height	Length: 264.15 m Height: 69 m
Excavation	7,80,000 cum
Concreting	4,04,748 cum
Dam Top Level	EL:773 m
FRL	EL :770.00 m
MDDL	EL: 764.50 m
Gross Storage	25.03 MCM
Live Storage	5.718 MCM
Max Water Level	771.49 m
Gross Head	536 m
Deepest Foundation	EL: 704 m
Average River Bed	EL: 706 m
Spillway type	Ogee Shaped
Spillway Crest	EL:735 m
Spillway Gates	6 nos – 9 m x 11.8 m
Intake (Monolithic with Bichom Dam) Structure:	

Concreting	13163 cum
Gate No & size m	2 nos of gates of size 5.82m (W) X 6.7m (H)
Invert Level	EL 750 m
Tenga Dam (Package - II - M/s Patel-Unity JV)	
Type	Concrete Gravity Dam
Length	103.00 m
Height	24.50 m
Excavation & Diversion	1,52,005 cum
Concreting	97,086 cum
Spillway Type	Flat Apron Type
Spillway Crest	756 m
Spillway Gates	2 nos – 14 x 14 m
Dam Top Level	EL 773 m
FRL	770.00 m
MDDL	763.00 m
Gross Storage	0.50 MCM / Mm ³
Live Storage	0.50 MCM / Mm ³
Design flood	3862 Cumec
Max water level	EL 771.67 m
Deepest Foundation	EL 748.60 m
Av. River bed	EL 756 m
Drift tunnel length	80 m
Drop Shaft height	29.78 m
Tenga Intake	
Gate No & Size	1 no of Drop Shaft Gate of size 1.6m X 1.6m
Water Conductor System (WCS):	
Tunnel Adits	4 Nos / 1095.22 m
Head Race Tunnel (HRT) – 8 Faces	Length: 14.527 km / Dia. :6.70 m / Modified Horse Shoe
Face I	785 RM
Face II	3892.6 RM
Face III	4546 RM
Face IV	132 RM
Face V	265 RM
Face VI	1684 RM
Face VII	3015 RM
Face VIII	134.25 RM
Cut & Cover length at Tenga Crossing	94.30 RM
High Pressure Tunnel (HPT)	1 No. of Pressure Tunnel of 5.30 m dia Bifurcates to 2 Nos. of 3.75 m dia which further Bifurcates to 2 Nos. of 2.65 m each to feed 4 Units of 150 MW in Power House.
Gross Length	3676 Rm
Open Excavation for Surface Penstock & Valve House	4,62,504 cum
Surface Penstock concreting	58884 cum
Surge Shaft (Package – III - M/s Patel-Unity JV)	
Type	Restricted Orifice / Non Overflow.
Size	Dia : 25m. Height : 69.35 m Orifice Dia : 3.75m Orifice Height : 9.35 m
Power House (Package - III - M/s Patel-Unity JV)	
Type	Surface
Gross Head	536 m
Design Head	504 m
Size	120 m (L) x 37.30 m(W)
Excavation	10,85,306 cum
Concreting	88580 cum
Tailrace Channel	Open Channel - 50 m x 70 m
Excavation Tail Race Channel	35,400 cum
Concreting – Tail Race Channel	30500 cum
Hydro Mechanical Works: (Package - IV – M/s Om Metals M Ltd & JSG – JV)	
Erection of steel liner	3869 RM
Face IX	478.828 RM
Face X	310.000 RM

Face XI	342.500 RM
Face XII	158.25 RM
Face XIII	127.500 RM
Face XIV	49.732 RM
Face XV	49.684 RM
Face XVI	49.311 RM
Face XVII	49.324 RM
Surge shaft to VS I	15.000 RM
Vertical shaft I	91.113 RM
Vertical shaft 2	117.656 RM
Vertical shaft 3	120.676 RM
Vertical shaft 4	65.026 RM
Vertical shaft 5	59.485 RM
Surface Penstock (781.83 & 791.157)	
Surface Penstock I (Wye 1 & AB3)	15.00 RM
Surface Penstock I (AB 3 & 4)	88.732 RM
Surface Penstock I (AB 4 & 5)	100.601RM
Surface Penstock I (AB 5 & 6)	67.5 RM
Surface Penstock I (AB 6 & 9)	283.83 RM
Surface Penstock II (Wye1 & AB3)	18.48 RM
Surface Penstock II (AB 3& 6)	259.935 RM
Surface Penstock II (AB 6 & 9)	280.955 RM
Tenga Crossing	94.3 RM
Electro-Mechanical Works (Package - V – M/s BHEL)	
EOT Crane	FAFECO Make / 2 nos 190/35 T, 17.75 m
Penstock Valve	2 nos, Butterfly, Dia 3.75m
Main Inlet Valve	Spherical, Dia: 1.8 m
Turbine	
Rated Output	153.830 MW
Turbine efficiency	92.98%
Net rated head	501.22 m
Net max/ min head	531.5 m
Runner Inlet /Outlet	Inlet: 3.1m, Outlet: 2.046 m
Efficiency at Full Load	95.96%
Specific Speed	72.49 rpm
Design Discharge	140 Cumec
Generator	BHEL (Make)
Generating Mode	Semi Umbrella
Rated Output	167.5 MVA
Voltage	13.8 kV
Rated Stator Current	1128 A
Power Factor	0.9 (Lagging)
Efficiency at Full Load	98.933%
Excitation System	Static, Synchronous
Generator Transformer	BHEL (Make) 13 nos, 1-Phase, ODWF Cooled, 63 MVA, 1 ϕ
Voltage Ratio	13.8/420/ $\sqrt{3}$ kV
Switchyard – (Package VI – M/s Techno Electric & Engg. Co. Ltd.)	
Type	Double Main & Transfer
Bays	10 (4 nos GTs, 1 Bus Coupler, 1 Transfer, 2 Lines, 1 Bus Reactor, 1 ICT (400 / 132 / 33 kV)
Excavation	1,71,800 cum
Filling	31,000 cum
Tower foundations	52 nos
Equipment	741 nos
Zebra conductor	11 Spans
Moose conductor	8 Spans
Bus Reactor	1 no, 80 MVAR
Station Service Transformer - (Package VII- M/s BHEL)	
HV Switch Gear	Crompton Greaves Ltd. (Make)
Type	Outdoor
Voltage Rating	400 kV & 132 kV
Evacuation System	Kameng – Balipara – 400 kV D/C = 76 Km 132 kV – Kimi – Khupi – Balipara = 69 Km