THDC India Ltd.

International Conference on
HYDROPOWER AND DAMS DEVELOPMENT FOR WATER AND ENERGY SECURITY – UNDER CHANGING CLIMATE

New Delhi
Central Board of Irrigation & Power

INCOLD
Indian National Committee on Large Dams

Ministry of Power
Central Electricity Authority

Identify and Harness Hydropower Potential in North Eastern Region

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Contents of Presentation

- Overview of Power Sector in NER
- Installed Capacity – Hydropower
- Summary of Hydropower development
- Hydropower Capacity Addition – Last 5 Years
- Hydropower Capacity Addition – Next 5 Years
- Policy Initiatives to boost Hydropower
- Way Forward – Suggested measures

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Overview of Power Sector in NER

- At present, All-India Installed Capacity is 3,95,608 MW, out of which the capacity of NER incl. Sikkim is, just about 6572 MW viz. less than 2% comprising 4309 MW of hydro power.
- **Power Supply Position in NE Region (Apr. 21 to Feb. 22)**

States	Installed Capacity	Peak Demand (MW)	Peak Met (MW)	Energy Requirement (MU)	Energy Supplied (MU)
Sikkim	2282	133	133	557	557
Ar. Pradesh	815	197	168	799	799
Assam	1745	2126	2121	10035	10017
Manipur	141	258	258	936	935
Meghalaya	322	408	408	2056	2043
Mizoram	60	169	156	596	584
Nagaland	75	173	153	782	781
Tripura	1132	328	327	1454	1454
	6572			**17215**	**17170**

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HYDROPOWER DEVELOPMENT – INDIA

As on 31.03.2022

STATE	Identified Potential (MW)	Developed (MW)	Under Dev. (MW)	Balance (MW)
NE Region	62,604	4309	3,157	55,138
		6.88%	5.04%	88.07%
Uttarakhand	17,998	3,855	1,391	12,752
		21.42%	7.73%	70.85%
J&K	11567	3,360	2,560	5647
		29.05%	22.13%	48.82%
H.P.	18,470	9,920	2290	6260
		53.11%	12.64%	33.89%
Other States	34,681	20,092	1,786	12,803
		57.93%	5.14%	36.91%
Total	145320	41,536	11,184	92,600
		28.58%	7.70%	63.72%

HYDROPOWER DEVELOPMENT IN N.E.R.

As on 31.03.2022

STATE	EXPLOITABLE POTENTIAL (MW)	DEVELOPED (MW)	UNDER DEVLPMNT. (MW)	Under Planning (MW)	Balance (MW)
Arunachal Pradesh	50,064	1115	2000	7271	39678 (79.25%)
Meghalaya	2,298	322	0	355	1,621 (70.54%)
Mizoram	2,131	60	0	0	2,071 (97.18%)
Manipur	1,761	105	0	66	1,590 (90.29%)
Nagaland	1,452	75	0	186	1,191 (82.02%)
Assam	650	350	120	0	180 (27.69%)
Sikkim	4,248	2,282	1,037	520	409 (9.69%)
Total	**62,604**	**4,309**	**3,157**	**8398**	**46740(74.66%)**

As on 31.12.2021

HYDROPOWER DEVELOPMENT IN N.E.R.

		Installed Capacity (MW)
Identified Hydro potential		62604 (above 25 MW)
I	H.E. Projects in operation (22 nos.)	4309
II	H.E. Projects under construction (7 nos.)	3157
III	H.E. Projects concurred by CEA (17 nos.)	15605
IV	H.E. Projects under examination in CEA	NIL
VI	H.E. Schemes under S&I (4 nos.)	1610

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HYDRO CAPACITY ADDITIONS IN LAST 5 YEARS

S. No.	Name of Project	I.C. (MW)	Implementing Agency	Commissioning
Arunachal Pradesh				
1	Kameng	600	NEEPCO	2020-21
2	Pare	110		2018-19
	Total (Ar.Pr)	710		
Meghalaya				
3	New Umtru	40	MePGCL	2017-18
Sikkim				
4	Rongnichhu	113	MB Pvt Ltd.	2021-22
5	Jorethang Loop	96	DANS Pvt. Ltd.	2015-16
6	Teesta-III	1200	Teesta Urja Ltd.	2016-17
7	Dikchu	96	Sneha Kinetic	2017-18
8	Tashiding	97	Shiga Energy	2017-18
	Total (Sikkim)	1602		
Mizoram				
9	Turial	60	NEEPCO	2017-18
Total (NER+ Sikkim)		**2412**		

Likely Hydro Capacity Additions - Next 5 Years

S. No.	Name of Project	State	I.C. (MW)	Developer	Likely Comm.	Present Status
1	Subansiri Lower	Ar. Pr.	2000	NHPC	2022-24	Under-construction
2	Teesta- VI	Sikkim	500	NHPC	2023-24	Under-construction
3	Lower Kopili	Assam	120	APGCL	2024-25	Under-construction
4	Rangit-IV	Sikkim	120	NHPC	2024-25	Under-construction
5	Bhasmey	Sikkim	51	Gati Infra. Ltd.	2024-25	Under-construction
6	Rangit-II	Sikkim	66	Sikkim Hydro Power Ventures	2024-25	Under-construction
7	Panan	Sikkim	300	Himgiri Hydro Energy	2025-26	Under-construction
8	Wah Umiam Stage-III	Megh.	85	NEEPCO	2027-28	Concurred
9	Loktak Down Stream	Manipur	66	LDHCL	2027-28	Concurred
	Total (NER+ Sikkim)		**3308**			

POLICY MEASURES FOR PROMOTING HYDRO POWER

Issued in March,2019

- **Declaring Large Hydropower Projects as Renewable Energy Source**
- **Hydro Purchase Obligations as a separate entity within Non-Solar Renewable Purchase Obligations**
- **Tariff Rationalization measures for bringing down hydropower tariff**
- **Budgetary Support for Flood Moderation/ Storage Hydro Electric Projects**
- **Budgetary support to cost of Enabling Infrastructure (roads/ bridges)**

HPO Trajectory upto 2030 already notified on 29.01.2021.

Budgetary Support towards cost of Enabling Infrastructure & Flood Moderation also notified on 28.09.2021

Particularly beneficial for development of hydro projects in NE Region which are located in remote and far-flung areas and requires development of extensive associated infrastructure. Capital cost as well as the project tariff would be reduced in initial years which would improve project viability & saleability

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Recent Developments in Hydro in NER

Development of a no. of hydro projects has been put on track in NER including

- **Lower Subansiri (2000 MW)** - Construction of the Project started in Jan'05. Works were stalled in Dec'11. Matter was pursued actively before NGT and finally, project was cleared by NGT in July, 19. Construction was resumed after 8 years. Likely commissioning is in 2023-24. All efforts are being done to commission two units by Aug.'22.
- **Teesta-VI (500 MW)** NHPC is first CPSE in India to acquire a hydro project through Corporate Insolvency Resolution Process. Likely commissioning in 2023-24
- **Rangit-IV (120 MW)-** NHPC has been declared successful bidder for acquisition of Rangit-IV HE project through NCLT route. Investment approval for this project is in final stage. Likely commissioning in 2025-26
- **Dibang (2880 MW)** – Pre-construction works are in progress

Recent Developments in Hydro in NER- Identification of HEPs for development by CPSUs

- **MoP on 22.12.2021 identified hydropower projects in Arunachal Pradesh to be developed by CPSUs as under:**

CPSU	Nos.	IC (MW)
NEEPCO (Kameng, Tawang, Siang tributaries)	7	4988
NHPC (Dibang HEP and Subansiri Basin)	3	6680
JV of NHPC & NEEPCO (Siang Main Stem)	2	12700
SJVN (Dibang basin except Dibang HEP)	5	5097
THDC (Lohit)	2	2950
Total	**29**	**32415**

- **Evaluation Committee has been Constituted**

Issues in NER

- **Land acquisition** : Non-availability of proper land records leads to delays
- **Environmental and Forest:** Non availability of land for Compensatory Afforestation/ creation of Land Banks.
- **Lack of adequate infrastructure/ roads and bridges:**
- **Rehabilitation and Resettlement:** Local agitation/ Law & Order problems
- **Contractual issues and Financial Crunch**
- **High Tariff and Non signing of PPAs for hydro projects:** Deterrent for the developers undertaking new projects often resulting in non tie-up of funds (Financial Closure
- **Free Power :** NE States may consider deferment and staggering of free power till repayment of loan period or 12 years. Improves financial viability & saleability of the hydro projects- Already in practice in states like J&K and HP.
- **Power evacuation issues:** Need to be ensured in a schedule matching with commissioning of the hydro projects.

Way Forward

- Free power waiver/ staggering and allocating risk and responsibility with States
- Increasing involvement of CPSUs in development of Hydro & PSPs and allotment of delayed/ stalled hydro projects by the States to CPSUs on nomination basis in consultation with MOP
- Involving States as Equity Partners in Hydro Projects
- Reviving Private Investment through PPP route and VGF Support
- Availability of loans for longer duration of 18 to 25 years and reduction of interest rate during operational period
- Support for preparation of DPRs to create shelf of projects
- Explore possibility of Support for Transmission
- Basin-wise approach to development of hydro potential

Impact of Free Power, ROE, Debt-Equity on Hydro Tariff

S. No.	Scenario	1st Year Tariff	Lev. Tariff	Impact
1	Base case (18 yrs loan repayment)	7.30	6.97	
2	Loan repayment_25 Years	6.90	6.93	40p
3	Reducing O&M base rate-3%	7.14	6.67	16p
4	Staggering of free power	6.76	6.68	54p
4	Reduced RoE of 14%	6.92	6.58	38p
6	Combined Impact (2 to 5)	5.72	6.00	148p

Impact of Debt-Equity (75:25 to 80:20)- Reduction of 20-25p

Funding 20% at Concessional Rates – 30-35p

THANK YOU

Impact of Free Power, ROE, Debt-Equity on Hydro Tariff- Assumptions

- Total Capital Cost (Including IDC) – 10 Rs Cr/MW
- CUF – 35%
- D/E ratio – 70:30
- RoE – 16.5%
- Interest on loan – 8%
- Life of the project – 40 Years
- Interest on WC –10.5%
- Base O&M exp – 3.5%
- O&M Exp (escalation) – 4.77%
- Free Power – (12+1)%

Staggering of Free Power - Assumptions

Start Year	End Year	No of Years	% Free Power
1	9	9	**6.00**
10	18	9	**10.00**
19	40	22	**17.09**
Weighted Average		**40**	**13**

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NER-HYDRO CAPACITY ADDITION (2022-2032)

S. No.	Name of Project	State	I.C. (MW)	Impl. Agency	Likely Comm.	Present Status
1	Subansiri Lower	Ar. Pr.	2000	NHPC	2022-24	Under-construction
2	Lower Kopili	Assam	120	APGCL	2024-25	Under-construction
3	Teesta- VI	Sikkim	500	NHPC	2023-24	Under-construction
4	Rangit-IV	Sikkim	120	NHPC	2024-25	Under-construction
5	Bhasmey	Sikkim	51	Gati Infra. Ltd.	2024-25	Under-construction
6	Rangit-II	Sikkim	66	Sikkim Hydro Power Ventures	2024-25	Under-construction
7	Panan	Sikkim	300	Himgiri Hydro Energy	2025-26	Under-construction
8	Talong Londa	Ar. Pr.	225	GMR	2028-29	Concurred
9	Wah Umiam Stage-III	Megh.	85	NEEPCO	2027-28	Concurred
10	Loktak Down Stream	Manipur	66	LDHCL	2027-28	Concurred

NER-HYDRO CAPACITY ADDITION (2022-2032)

(Contd.)

Sl. No.	Project	State	IC (MW)	Developer/ Sector	Likely Comm.	Present Status
11.	Teesta-IV	Sikkim	520	NHPC/ C.S.	2029-30	Concurred
12.	Tato-I	Ar. Pradesh	186	Velcan/ Pvt.	2028-29	Concurred
13.	Heo	Ar. Pradesh	240	Velcan/ Pvt.	2028-29	Concurred
14.	Dibbin	Ar. Pradesh	120	KSK/ Pvt.	2028-29	Concurred
15.	Nafra	Ar. Pradesh	120	SEW/ Pvt.	2028-29	Terminated
16.	Kynshi-I	Meghalaya	270	AKPPL/ Pvt.	2029-30	Concurred
17.	Dikhu	Nagaland	186	NMPPL/ Pvt.	2028-29	Concurred
18.	Tawang-II	Ar. Pradesh	800	NHPC/ C.S.	2031-32	Concurred
19.	Attunli	Ar. Pradesh	680	AHEPCL/ Pvt.	2030-31	Concurred
20.	Demwe Lower	Ar. Pradesh	1750	ADPL/ Pvt.	2030-31	Concurred
21.	Dibang	Ar. Pradesh	2880	NHPC	2031-32	Concurred
Total			**11285**			