

43

**STANDING COMMITTEE
ON ENERGY
(2018-2019)
SIXTEENTH LOK SABHA**

MINISTRY OF POWER

HYDRO POWER

FORTY-THIRD REPORT



**LOK SABHA SECRETARIAT
NEW DELHI**

January, 2019/Pausha, 1940 (Saka)

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STANDING COMMITTEE ON ENERGY
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MINISTRY OF POWER

HYDRO POWER

Presented to Lok Sabha on 04.01.2019

Laid in Rajya Sabha on 04.01.2019



LOK SABHA SECRETARIAT
NEW DELHI

January, 2019/Pausha, 1940 (Saka)

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CONTENTS

| | PAGE |
|---|-------|
| COMPOSITION OF THE COMMITTEE (2018-2019) | (iii) |
| INTRODUCTION | (v) |
| REPORT | |
| PART I | |
| NARRATION ANALYSIS | |
| CHAPTER I Introductory | 1 |
| CHAPTER II Evaluation of Hydro Power | 3 |
| CHAPTER III Hydro Power Scenario in the Country | 7 |
| CHAPTER IV Issues in Development of Hydro Power Projects ... | 18 |
| PART II | |
| Observations/Recommendations of the Committee | 41 |
| ANNEXURES | |
| I. Status of Basin-wise cumulative impact studies | 53 |
| II. List of Hydro Stations (above 25 MW capacity) | 58 |
| III. Projects commissioned during 11th Plan | 77 |
| IV. Rate of sale of power of Hydro Power Stations for the year 2016-17 | 82 |
| V. The details of generation capacity since 1947 including share of hydro power | 95 |
| VI. State-wise details of under construction hydro electric projects (above 25 MW) having time overrun | 98 |
| VII. Hydro Electric schemes concurred by CEA and yet to be taken up for construction | 104 |
| VIII. List of Hydro-Electric Schemes in India under examination in CEA | 109 |
| IX. Projects pending due to Environment and Forest Clearances issues | 110 |
| X. Cost per Megawatt details of Coal Based Thermal Power Plants | 115 |
| | (i) |

| | PAGE |
|---|------|
| XI. List of Hydro Electric Schemes concurred/appraised by CEA during last 5 years | 116 |
| XII. Minutes of the 4th sitting of the Committee held on 29.10.2018 | 117 |
| XIII. Minutes of the 7th sitting of the Committee held on 07.12.2018 | 120 |
| XIV. Minutes of the 8th sitting of the Committee held on 02.01.2019 | 123 |

COMPOSITION OF THE STANDING COMMITTEE
ON ENERGY (2018-19)

Dr. Kambhampati Haribabu – *Chairperson*

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Lok Sabha

2. Shri Om Birla
3. Shri M. Chandrakasi
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SECRETARIAT

1. Ms. Rimjhim Prasad — *Joint Secretary*
2. Shri N.K. Pandey — *Director*
3. Shri Manish Kumar — *Senior Executive Assistant*

*Nominated as Member of the Committee w.e.f. 19th November, 2018 vice Shri Surendra Singh.

INTRODUCTION

1, the Chairperson, Standing Committee on Energy having been authorized by the Committee to present the Report on their behalf, present this Forty-Third Report on 'Hydro-power' relating to the Ministry of Power.

2. The Committee had a briefing on the subject by the representatives of the Ministry of Power on 29th October, 2018. The Committee, with a view to examine the subject in detail, had evidence of the representatives of the Ministry of Power on 7th December, 2018. The Committee also heard the views of the representatives of the State Governments of Himachal Pradesh, Jammu & Kashmir, Mizoram, Sikkim and Uttarakhand in regard to development of hydro power sector.

3. The Committee wish to express their thanks to the representatives of the Ministry of Power/the State Governments for appearing before the Committee and furnishing the desired information on the issues relating to the subject.

4. The Report was considered and adopted by the Committee at their sitting held on 2nd January, 2019.

5. The Committee place on record their appreciation for the valuable assistance rendered to them by the officials of the Lok Sabha Secretariat attached to the Committee.

6. For facility of reference and convenience, the observations and recommendations of the Committee have been printed in bold letters in Part-II of the Report.

NEW DELHI;
02 January, 2019
11 Pausha, 1940 (Saka)

DR. KAMBHAMPATI HARIBABU,
Chairperson,
Standing Committee on Energy.

REPORT

PART I

NARRATION ANALYSIS

CHAPTER I

INTRODUCTORY

1.1 The Committee, considering the greater importance of hydro power and the slow pace of its development in the country, took this subject for detailed examination. It is a matter of great concern that despite having numerous benefits and compelling need to have more balancing power in wake of huge upcoming renewable energy in the system; hydro power has not been paid the due attention. The fact that against the total potential of 2,41,844 MW hydro power including pumped storage scheme, only 45,399.22 MW is actually been utilized, speaks volumes. For optimum utilization of our hydro potential, there is a need for formulation of an enabling policy and taking this task on a mission mode with a timeline as it has already been done in case of development of solar and other renewable sources. During the examination of the subject it was felt that for the growth of hydro power sector the cooperation and coordination between the Central Government and the State Government has become a pre-requisite.

1.2 Hydro power is clean, green, sustainable and also a cheap source of power in the long run. Amongst the renewable sources of energy, hydro power has been recognized as the most preferred source of energy due to its inherent benefits. Thermal power generation stations are dependent on fossil fuels, which are limited and may not last long, whereas hydro power is a renewable source of energy. While hydro power has a long gestation period and needs huge upfront capital cost, it has much longer life and is free from fuel cost which significantly makes it cheaper in the long run. Moreover, hydro power stations, unlike coal based thermal power stations; do not emit pollutants into the environment. Hydro project have a long useful life. Some projects like Bhakra are in operation for last 50 years. While some others like Pykara (59.2 MW) & Mettur Dam (50 MW) in Tamil Nadu, Pallivasal (37.5 MW) in Kerala and Sivasamudram (42 MW) in Karnataka etc., are in existence for more than 70-80 years now.

1.3 As per India's Nationally Determined Contribution (NDC) commitments at COP-21 held at Paris in 2015, our country has to reduce the emissions intensity of its GDP by 33 to 35% by 2030 from 2005 level. mainly through arriving at a 40% share of renewables in the electricity generation mix and creating additional carbon sinks of 2.5 to 3 billion tonnes of CO₂ equivalent. Accordingly, the Government have planned for addition of 1.75 GW of renewable energy.

1.4 Hydro power, in the recent times, has gained greater importance due to the planning of 1.75 lakh MW capacity of power in the country from renewable sources, including wind and solar. Since these renewable sources of energy are intermittent in nature, it will require balancing power which can swiftly start up and stop down to provide grid stability. Conventional Hydro as well as Pumped Storage Schemes are the best energy storage technology to integrate renewable in the grid and to stabilize the grid in view of large capacity addition projected in the system from renewable sources which generate intermittent and variant energy.

1.5 Hydro projects generate employment for local people in remote hilly and backward areas and also provide incidental benefits of development of road/rail, telecommunications, electrification, industrialization and improvement of the quality of life in backward areas which lead to overall development of the area. Storage projects increase lean season flows, provide flood control, irrigation and drinking water supply benefits etc. and thus help in the maximum utilization of scarce water resources. Projects like Hirakud & Bhakra Dam have added to increased Agriculture Productivity and have been behind the success of Green Revolution in India while the role of Tehri Dam in mitigating the 2013 Uttarakhand disaster floods is well known.

1.6 A Socio Economic study of the resettled population was carried out by Administrative Staff College of India (ASCI). ASCI, in its report of May, 2009, has concluded that in the Rehabilitation & Resettlement for Tehri Hydro Power Project that there is improvement in living standards of project affected families when compared with the areas where they stayed earlier. Tehri project is a multipurpose project providing irrigation, drinking water and power benefits. Bhakhra & Nangal Dams are Multi-purpose hydro projects, which continue to provide benefits of irrigation, flood control, tourism, fishing etc. apart from generating large hydropower while rendering above services for last 50 years or so. Storage based hydro power projects improve the ground water recharge and thereby improve the ground water level. It is understood that groundwater levels have significantly improved after the Indira Sagar Storage Project of NHDC in Madhya Pradesh was commissioned besides providing benefits in terms of irrigation, crop production.

CHAPTER II

EVALUATION OF HYDRO POWER

2.1 The last survey for assessing hydro electricity potential in the country was completed by Central Electricity Act (CEA) in 1987. The broad parameters adopted for assessing the hydro potential in the country mainly included the then available topographical and hydrological information.

2.2 As per the study completed by CEA in 1987, the identified hydropower potential in the country has been assessed is 1,48,701 MW (1,45,320 MW from HE schemes above 25 MW capacity). Apart from this, there is also potential of 96,524 MW of Pumped Storage. Thus the total hydro power capacity including pumped storage is 2,41,844 MW. The details of the total potential are as given under:—

As on 31.10.2018

| | Conventional | | Pumped Storage | | Total |
|--|------------------|-----------|----------------|----------|-----------|
| | Nos. | I.C. (MW) | Nos. | I.C.(MW) | I.C. (MW) |
| Identified Hydro Capacity | 593 | 145320 | 63 | 96524 | 241844 |
| In operation | 197 [#] | 40613.62 | 9 | 4785.6 | 45399.22 |
| Under construction | 34 [*] | 10973.50 | 3 | 1205 | 12178.50 |
| Allotted for development | | | | | |
| (i) Cleared by CEA and yet to be taken up for construction | 40 | 25460 | 1 | 1000 | 26460 |
| (ii) Under Examination/scrutiny in CEA | 6 | 1224 | 0 | | 1224 |
| (iii) DPRs appraised and returned for revision | 29 | 9852 | 0 | | 9852 |
| (iv) Under S&I | 35 | 5439 | 3 | 2920 | 8359 |
| (v) S&I is held up/to be taken up | 45 | 14332 | 1 | 660 | 14992 |
| Sub-total (i-v) | 155 | 56307 | 5 | 4580 | 60857 |
| Total (I+II+III) | 386 | 107894.1 | 17 | 10570.60 | 118464.72 |

Note—14 nos. of Pumped Storage Schemes with aggregate capacity of 11245 MW have been identified as doable schemes for development. This includes development of PSS on existing conventional hydro projects includes utilizing either one or both the reservoirs in the upstream and the downstream thereby economizing the cost and minimizing the impact on environment.

[#]The total No. of HE Stations are 204 as N J Sagar HE Station (Southern Region) is having 1 conventional unit and remaining 7 units are PSS. Also, 1 unit of Panchet HE Station (Eastern Region) is conventional and other unit is PSS.

^{*}Out of 34 Schemes under construction, 16 schemes aggregating to 5190 MW are stalled due to various reasons.

2.3 As can be seen above, conventional hydro electric projects aggregating to 40,614 MW (27.9%) capacity are in operation, while 10,973.5 MW (7.6%) is under construction. In addition, DPRs in respect of conventional schemes with total capacity of 25,460 MW (17.5%) have been concurred by Central Electricity Act (CEA) which are, however, yet to be taken up for construction.

2.4 Details of hydroelectric potential in State endowed with substantial hydro power potential is as given under:—

| State | Identified Capacity (MW) | |
|-------------------|--------------------------|---------------|
| | Total | 25 MW |
| Arunachal Pradesh | 50328 | 50064 |
| Himachal Pradesh | 18820 | 18540 |
| Uttarakhand | 18175 | 17998 |
| Jammu & Kashmir | 14146 | 13543 |
| Rest | 47232 | 45175 |
| Total | 148701 | 145320 |

2.5 Identified hydro capacity in Arunachal Pradesh, as per reassessment study carried out in 1987, was 50,064 MW (in respect of the HE Schemes with capacity above 25 MW). The present status of development of hydro power in Arunachal Pradesh is as under:—

| Status of H.E. Projects | Nos. | I.C. (MW) |
|---|-----------|---------------|
| In Operation | 2 | 515 |
| Under Construction | 3 | 2,744 |
| Concurred by CEA and yet to be taken up for construction | 17 | 16,952 |
| Under Examination in CEA | 0 | 0 |
| DPR Returned by CEA to project authorities for resubmission | 13 | 6,329 |
| Under S&I | 26 | 3,707 |
| S&I held up | 20 | 9,462 |
| Yet to be allotted | 17 | 13,205 |
| Total | 98 | 52,914 |

2.6 As the assessment of hydro power potential was done long before in 1987, the Committee desired to know about the need for re-assessment of the same. It was stated by the Ministry that the same has been felt mainly due to availability of updated information regarding development of hydro projects in the country, updated hydrological and topographical information and information relating to Land use and submergence, etc. In addition, changes in environmental norms relating to e-flows, free flow catchment, water utilization under various Agreements/Tribunal awards, constraints on development under International Agreements, etc. would also be taken into consideration while carrying out the review.

2.7 At present, hydro power only upto capacity of 25 MW is termed as renewable energy source while the larger capacity hydro projects are still included in conventional energy sources. When the Committee asked for the rationale behind such categorization, the Ministry have stated as under:—

“All hydro projects are traditionally renewable in nature. Since Hydro Power projects upto the capacity of 25 MW stands allocated to Ministry of New and Renewable Energy (MNRE) (Initially Ministry of Energy, later bifurcated to Ministry of Non-Conventional Energy Sources, which was finally renamed as MNRE in 2006), only these are categorized as renewable energy source. Thus, the categorisation was on the basis of allocation of work and not on the renewable nature of source. One of the measures formulated by MoP in the proposal for “Revival of hydro power sector” includes declaring all hydro projects as renewable irrespective of their size and capacity. The proposal is presently under advanced stage of inter-ministerial consultations.”

2.8 When the Committee asked for the details of the River Basin Study done in regard to setting up hydro power projects and also about the minimum environmental flow of the river, the Ministry in their written reply have stated as under:—

“During last few years, river basin studies have been got carried out by MoEF for the major river basins in Arunachal Pradesh including Siang, Subansiri, Lohit, Kameng, Tawang, Bichom & Dibang etc., and Chenab basin in Himachal Pradesh etc. A brief status of some of the river basin studies in Arunachal Pradesh & Himachal Pradesh, as available in CEA, is enclosed at **Annexure-I**.

Based on the River Basin Studies carried out, certain environmental flows have been recommended to be released in the downstream stretch of the river during different seasons to maintain the river eco-system and bio-diversity including flora, fauna & aquatic life.

The rationale or details of the studies made in this regard are available with MoEF&CC. However, broadly the environmental flows are decided to maintain minimum depth as well as minimum width of river during different seasons for sustenance of the aquatic life besides the existence of flora and fauna. The quantum the e-flow releases recommended in these Basin Study Reports vary from project to project.”

CHAPTER III

HYDRO POWER SCENARIO IN THE COUNTRY

3.1 All India installed capacity (in MW) of Power Stations is as under:—

| Sector | Thermal | | | | Nuclear | Hydro | RES (MNRE) | Grand Total | |
|---------|-----------|---------|----------|--------|-----------|---------|---------------|----------------|-----------|
| | Coal | Lignite | Gas | Diesel | | | | | Total |
| State | 62966.50 | 1290.00 | 7118.71 | 363.93 | 71739.13 | 0.00 | 29878.80 | 1983.87 | 103601.80 |
| Private | 74316.00 | 1830.00 | 10580.60 | 473.70 | 87200.30 | 0.00 | 3394.00 | 68501.64 | 159095.94 |
| Central | 53010.00 | 3240.00 | 7237.91 | 0.00 | 63487.91 | 6780.00 | 12126.42 | 1527.30 | 83921.63 |
| Total | 190292.50 | 6360.00 | 24937.22 | 837.63 | 222427.34 | 6780.00 | 45399.22 | 72012.81 | 346619.37 |
| % | | | 64.3% | | | 2.0% | 13.1% | 20.6% | |

3.2 Following is the details of hydro power projects in operation, Sector-wise:—

| Private | Central | State | Total |
|-------------------|----------------------|----------------------|-----------|
| 7.5% (3394 MW) | 33.1% (15,047 MW) | 59.4% (26,958 MW) | 45,399 MW |

3.3 The details of hydroelectric projects in operation—State-wise are as under:—

| Sl. No. | Name of the State | I.C. (MW) | | |
|---------|-------------------|-----------|--------|--------|
| | | HEP | PSP | Total |
| 1 | 2 | 3 | 4 | 5 |
| 1. | Himachal Pradesh | 9809 | — | 9809 |
| 2. | Uttarakhand | 3756.4 | — | 3756.4 |
| 3. | Karnataka | 3644.2 | — | 3644.2 |
| 4. | Jammu & Kashmir | 3449.0 | — | 3449.0 |
| 5. | Maharashtra | 2647.0 | 400.0 | 3047.0 |
| 6. | Telangana | 800 | 1605.6 | 2405.6 |
| 7. | Madhya Pradesh | 2235.0 | — | 2235.0 |
| 8. | Tamil Nadu | 1778.2 | 400.0 | 2178.2 |

| 1 | 2 | 3 | 4 | 5 |
|-----|-------------------|---------|--------|---------|
| 9. | Sikkim | 2169.0 | — | 2169.0 |
| 10. | Odisha | 2142.3 | — | 2142.3 |
| 11. | Gujarat | 550.0 | 1440.0 | 1990.0 |
| 12. | Kerala | 1856.5 | — | 1856.5 |
| 13. | Andhra Pradesh | 1610.0 | — | 1610.0 |
| 14. | West Bengal | 441.2 | 940.0 | 1381.2 |
| 15. | Punjab | 1096.3 | — | 1096.3 |
| 16. | Arunachal Pradesh | 515.0 | — | 515.0 |
| 17. | Uttar Pradesh | 501.6 | — | 501.6 |
| 18. | Rajasthan | 411.0 | — | 411.0 |
| 19. | Assam | 350.0 | — | 350.0 |
| 20. | Meghalaya | 322.0 | — | 322.0 |
| 21. | Jharkhand | 170.0 | — | 170.0 |
| 22. | Chhattisgarh | 120.0 | — | 120.0 |
| 23. | Manipur | 105.0 | — | 105.0 |
| 24. | Nagaland | 75.0 | — | 75.0 |
| 25. | Mizoram | 60.0 | — | 60.0 |
| | Total | 40613.6 | 4785.6 | 45399.2 |

3.4 There are following four types of hydro projects:—

- (i) Purely Run-of-River Schemes—with no pondage/storage.
- (ii) Run-of-River Schemes with pondage—with little pondage/storage (Daily/Weekly).
- (iii) Storage Schemes—with reservoir to store excess water in high flow period for utilization during low flow periods.
- (iv) Pumped Storage Schemes—has two reservoirs, upper & lower, water flows from upper reservoir to lower reservoir during generation and vice versa-during pumping.

3.5 The Ministry have stated that out of 37 Schemes (12,178.5 MW) under construction, 16 schemes aggregating to 5,190 MW are stalled due

to various reasons details of which are as follows:–

Issues involved in Stalled HE Projects

| Issues | No. of Projects | Capacity (MW) |
|---------------------------|-----------------|---------------|
| Financial constraints | 10 | 1563 |
| Subjudice matter/NGT Case | 3 | 2471 |
| Inter-State Issue | 1 | 206 |
| R&R and local issues | 1 | 850 |
| Other issues | 1 | 100 |

3.6 Type-wise summary of hydro power projects in operation are given as under:–

| Run of the River | Run of the River (Pondage) | Storage | Pumped Storage | Total |
|------------------|----------------------------|-----------|----------------|-----------|
| 3,891 MW | 16,206 MW | 20,517 MW | 4,785 MW | 45,399 MW |

3.7 The following is the details of Green House Gas Emissions by different sources of Power:–

| Source of Power | GHG Emissions/kWh (Gram Equivalent CO ₂) |
|-----------------|--|
| Thermal - Coal | 957 |
| Thermal - Gas | 422 |
| RES - Solar | 38 |
| Hydro - Storage | 10 |
| RES - Wind | 9 |
| Nuclear | 6 |
| Hydro - RoR | 4 |

3.8 A list of Hydro Electric Stations in the country along with their year of commissioning, installed capacity, location as available in CEA is enclosed at *Annexure-II*. The list of hydroelectric projects (above 25 MW) commissioned since year 2007 till date with their year of inception, location, capacity, time taken for development and cost of the project is enclosed as *Annexure-III*. The rates of sale of power of hydro power plants for the year 2016-17, as available in CEA, are enclosed at *Annexure-IV*.

3.9 The share of hydro power in the total energy mix is on a constant fall ever since it reached its peak of 51% in the year 1962-63. At present the share of hydro power is meager 13%. The details of generation capacity since 1947 including share of hydro power is enclosed at *Annexure-V*. When the Committee asked for the reason for decline of hydro power share, the Ministry have stated as under:—

“The main reasons for consistent decline of hydro share are discussed below:—

- Up to 1960s, the major emphasis of the Government was on development of multi-purpose reservoir based hydro projects like Hirakud, Bhakhra, Damodar Valley projects etc. mainly to have irrigation for better food security which also led to significant development/augmentation of hydro generation capacity in the country.
- A number of factors apart from lack of adequate infrastructure have contributed to the slow growth of hydro in subsequent years. One of the major factors is drying-up of funding by bi-lateral/multi-lateral agencies as their focus shifted from infrastructure based projects to social and health sector projects etc.
- Further, the environment clearance regime for hydro projects after 1970s has also become increasingly stringent due to world-wide focus on environmental & ecological and R&R issues and consequent activism against the development of hydro projects by NGOs/Environmental activists (eg. Narmada Bachao Abhiyaan by Ms. Medha Patekar, Chipko Movement of Sh. Sunder Lal Bahuguna and Silent Valley protests etc.). Such activism led to wide spread delays in development of hydro projects like Indira Sagar, Sardar Sarovar, Tehri etc. This also led to cancellation of multi-lateral funding in projects like Sardar Sarovar (1450 MW), Upper Indravati (600 MW), Sharavathy TR (240 MW) and Kalinadi-2 (120 MW) etc. and non-tie up of World Bank loan in respect of others like Indira Sagar Project (1000 MW) etc.
- In addition, a number of Acts have been introduced since the 1970s by the Government including The Water (Prevention and Control of Pollution) Act of 1974, The Forest (Conservation) Act of 1980, The Air (Prevention and Control of Pollution) Act of 1981, The Environment (Protection) Act of 1986, The Recognition of Forest Rights Act of 2006 etc.

- As a result, there was a greater emphasis on rapid development of thermal projects (having shorter gestation period) as a short-term measure to cater to growing industrial and other demands and the share of hydro continued to slide.
- Even after opening up of the power sector for private sector participation and subsequent allotment of large number of hydro projects by the respective State Govts., the process of implementation of hydro projects is still getting delayed due to a number of issues like delay in acquisition of land apart from delays due to environmental and forest issues, local issues including law & order problems, inter-State issues, financial crunch with the developer, geological surprises and contractual issues etc.
- In the recent years, increasing thrust on Renewable capacity addition has further reduced the share of hydro in the energy mix.”

3.10 On being asked by the Committee for the details of the all hydro power projects which are under the various stages of development and the issue/delay, if any, being faced in their development, the Ministry have furnished the following information:—

“A total of 37 number hydroelectric projects aggregating to 12,178.5 MW are presently under construction. Out of the 37 nos. of projects, 35 nos. of projects have suffered time-over run. The details of these hydroelectric projects along with issues faced/reason for the delay in their development is enclosed as *Annexure-VI*. A total of 41 number Hydroelectric projects aggregating to 26,460 MW have been concurred/appraised by CEA which are yet to be taken up for construction in the country. The details are enclosed at *Annexure-VII* respectively. Further, 6 nos. of hydroelectric projects aggregating to 1,224 MW are presently under examination in CEA. The details are enclosed at *Annexure-VIII*.”

3.11 The Committee while seeking the details of the hydro power projects which have suffered cost-overflow desired to know whether it not be more cost effective if the State Government are given some kind of incentives if they pro-actively help in timely completion of the projects. The Ministry replied as under:—

“State Governments can play a vital role in helping developers in resolution of various issues like Land acquisition, Resettlement & Rehabilitation of Project Affected People, allotment of quarries, muck dumping sites, Environment & Forest issues, maintaining law & order, disaster management, etc. State Governments are presently being

given incentive of free power and Local Area Development Fund for the project which are under construction in the State. Further, generation of employment, building of Infrastructure (bridges/roads), enhancing tourism, overall economic upliftment of the people and availability of healthcare and educational facilities, providing water for irrigation & drinking (in case of multi-purpose hydro projects), providing peak power for better grid stability etc. are other incentives to the State which are indirect in nature.”

3.12 When the Committee desired to know the pros and cons of the proposal that the respective State Government is invariably be made stakeholder in hydro power projects, the Ministry in their written reply have stated as under:—

“Making State Governments a stakeholder (Equity participation), of course, can help in faster resolution of issues related to State matters and thus can help in containing the time & cost over-run. However, it is observed that some States like Arunachal Pradesh, in their Hydro Policy, have made provision for State Equity in the project but do not have sufficient funds for equity investment in the project. Subsequently, they have raised demands for additional free power from the project in lieu of foregoing their equity rights in the project which would add to project development cost/tariff.”

3.13 The salient features of existing Hydro Power Policy, 2008 at centre (including subsequent changes) are as below:—

- Transparent selection procedure/criteria to be followed by the States for awarding sites to private developers based on a single quantifiable parameter.
- The dispensation regarding exemption from tariff based bidding, available to the Public Sector under the National Tariff Policy, 2006, also extended to private sector hydroelectric projects up to January 2011 (since extended up to 15.08.2022 in Revised Tariff Policy, 2016).
- To enable the project developer (public as well as private sector hydro developers) to recover the costs incurred by him in obtaining the project site, the policy allows a special incentive to the developer by way of merchant sale of upto a maximum of 40% of the saleable energy.
- An additional 1% free power from the project (over and above 12% free power earmarked for the host State) would be provided and earmarked for a Local Area Development Fund, aimed at providing a regular stream of revenue for income generation and welfare schemes, creation of additional infrastructure

and common facilities etc. on a sustained and continued basis over the life of the project with a matching contribution of 1% by the host State Govt. to this corpus fund.

- Developer to provide 100 units of electricity per month to each Project Affected Family—in cash or kind or a combination of both for 10 years from the COD.
- Developer to assist in implementing rural electrification in the vicinity of the project area & contribute 10% share of the State Govt. under the RGGVY scheme.

3.14 In our country hydro power projects upto the capacity of 25 MW are categorized under the renewable energy source while the projects having more capacity fall under conventional energy sources. When the Committee asked for the rationale behind such categorization, the Ministry in their written reply have stated as under:—

“All hydro projects are traditionally renewable in nature. Since Hydro Power projects upto the capacity of 25 MW stands allocated to Ministry of New and Renewable Energy (MNRE) (Initially Ministry of Energy, later bifurcated to Ministry of Non-Conventional Energy Sources, which was finally renamed as MNRE in 2006), only these are categorized as renewable energy source. Thus, the categorisation was on the basis of allocation of work and not on the renewable nature of source. One of the measures formulated by MoP in the proposal for “Revival of hydro power sector” includes declaring all hydro projects as renewable irrespective of their size and capacity. The proposal is presently under advanced stage of inter-ministerial consultations.”

3.15 When the Committee desired to know the barriers/deterrence/drawbacks in generation of Hydro Power through run of the river instead of designing it in a manner best suited for peaking power requirement as doing the same reduces the land requirement substantially, the Ministry replied as under:—

“Hydro Plants have instantaneous start and stop capability and as such, these are commonly used for intense load following and to meet peaking and balancing power demand. Availability of diurnal pondage (small storage adequate for daily operational variation) imparts some flexibility in operation of these plants without affecting the daily energy generation capability of the plant. The plants with seasonal storage, on the other hand, provide much greater degree of flexibility in operation of the plant and augment flows as well as energy generation during lean flow months, besides contributing to water management activities like flood control, irrigation, drinking water, etc.

Both these types of stations help in improving grid security and stability due to their capability to provide fast ramping, reactive power management and black start capability, etc. In absence of hydro, such services may have to be rendered either Gas power stations or DG sets or we may have to resort to shutdowns.

Purely run-of-river plants, on the other hand, do not have any pondage, the generation pattern from these stations corresponds to the pattern of flows in the river, and there is no flexibility in operation of these plants making them totally unsuitable for peaking and balancing operation. Moreover, the excessive flows during monsoon seasons, over and above the design discharge of the generation units are released in the down-stream of the dam through operation of the spillway.

Regarding reduction in land requirement and the impact on environment in case of purely run of river project, the same could be true only to some extent. However, in case a peaking station with a relatively smaller dam and a tunnel is converted to a purely run of river project at the same dam location, apart from the peaking loss, overall energy benefits from the project would also be significantly reduced. To achieve similar energy benefits, a much higher dam may be required to create head for generating power and consequently large area would be submerged.

The land requirements for large storage dams are much higher. However, these projects are designed mostly for multipurpose benefits with irrigation and flood control etc. as the primary benefits and the power generation as incidental just like Bhakhra and Tehri etc.”

3.16 Most of the Eastern/North-Eastern parts of the country are devastated by the flood every year and money to the tune of thousands of crores of rupees are spent on flood relief measures. When the Committee asked whether there can be a similar multi-purpose hydro power projects on the lines of Bhakhra-Nangal Dams near and around Bihar, the Ministry have replied as under:—

“Bhakhra & Nangal Dams are Multi-purpose hydro projects which provide benefits of irrigation, flood control, tourism, fishing etc. apart from the hydro power. However, all hydro Projects are site specific in nature and their site selection mainly depending on feasibility of dam construction, availability of head in river, hydrology/discharge, environment regulations etc.

As per the reassessment of study of hydro potential completed by CEA in 1987, no storage site has been identified within Bihar for construction of storage based hydro scheme. However, Sapta Kosi High Dam Multipurpose Project (3300 MW) and Sun Kosi Storage cum Diversion Scheme has been proposed to be constructed within Nepal at Barakshetra close to Bihar which would have flood management component.

Based on the feasibility report for the project prepared by India in 1981, the project would afford irrigation and flood control benefits in Bihar apart from 15730 MU of power generation. In addition, development of Inland Waterways through Kosi and Ganga rivers is another important component of the project. DPR for the project is presently under preparation by a Joint Project Office, established at Birat Nagar for carrying out detailed investigations/field works and of DPR which is likely to be completed by Sept., 2019.”

3.17 The Committee being aware of various misconceptions about the hydro power projects especially large one that have hindered the development of hydro power sector, sought clarification in this regard. The Ministry in their reply have furnished the following information:—

“Certain misconceptions seem to have been associated with the development of all hydro projects in general and large hydro projects in particular. These mainly relate to their perceived adverse impact on environment, forests and wildlife, large submergence of private and forest land and consequently large displacement of population and R&R issues involved etc. which have hindered development of hydro sector in general. Some of the incidences are as below:

- Rehabilitation and resettlement issues have proved as one of the major roadblocks for the development of large hydro projects like Sardar Sarovar Dam and Tehri Dam which faced stiff opposition.
- There have been anti-dam movements due to perception that project like Sardar Sarovar Dam has been designed, planned and approved without adequate information and knowledge about costs, benefits and ‘environmental and social impacts’ of the project and very long litigation was seen due to such anti dam movement during the project implementation.
- There have also been concerns of flooding in downstream areas in case of failure of large hydro dams.

Various anti-dam movements, local agitation and R&R related issues indicate that wide scale apprehensions are present in the minds of local people due to construction of big dams.”

3.18 On being asked by the Committee as to what lessons have been learned from these incidences, the Ministry replied as under:—

“The following lessons seem to have been learnt:

- Rehabilitation and resettlement should be done in such a manner so as to ensure that project affected families are offered attractive compensation and are resettled well before the start of the project. This would help in reducing litigation and time delays associated with that and would also boost public confidence for future projects.
- With the help of awareness campaigns, local people should be made aware about the project benefits and they could be made to feel associated with the entire development process which would help improving the sense of belongingness among the locals towards the project being developed.
- Success stories where large dams like Tehri Dam in Uttarakhand has proved helpful in moderation of floods in the downstream and has significantly contributed to the augmentation of lean period flows in the river Ganga need to be highlighted to counter adverse publicity.
- Projects need to be constructed at a fast pace to avoid persistent R&R issues.

3.19 In regard to efforts to overcome such issues, the Ministry have further stated:—

“Govt. has made efforts on its part to expedite development of the hydro projects which includes National Rehabilitation & Resettlement Policy 2007 aims to minimize displacement, to plan the R&R of PAFs including special needs of Tribal and vulnerable sections, to provide better standard of living to PAFs and to facilitate harmonious relationship between the Requiring Body and PAFs through mutual cooperation.

- Certain provisions have been made in the Hydro Power Policy such as Local Area Development Fund (LADF), 100 units per month free to each of the project affected family etc. which aims for development of local area.
- There has been significant development in respect of issue relating to the Environmental and social impact of the project. EIA and EMP studies are carried out before granting environment clearance and Social Impact Assessment is also being carried

out. Provisions of minimum environmental flows and free flow stretch have been incorporated so that impact on environment is minimized due to development of the project.”

3.20 The Committee during the examination of the subject raised the issue that an apprehension is expressed by certain quarters in the country that in case of geological disturbances, the dams of hydro power may prove disastrous and devastating. The Committee, therefore, desired to know about the measures taken to ensure safety of the dams from seismic activities and how far the apprehension in this regard is real, the Ministry replied as under:—

“Yes, the dams are designed to withstand maximum possible earthquake and are able to face seismic activities up to its designed limit. Dams are designed on the basis of seismic criteria for Maximum Credible Earthquake (MCE) and Design Basic Earthquake (DBE). Seismic aspects of the areas where the dam is to be built are evaluated scientifically by experts institutions like Deptt. of Earthquake Engineering, IIT, Roorkee and other such institutions. These technical reports detailing the Seismic parameters are approved by NCSDP (National Committee on Seismic design parameters)—a committee constituted by GOI and comprising of experts from various disciplines of organizations like GSI, CWPRS, IIT and chaired by a member of CWC. The dams are then designed as per these seismic parameters and are cleared by CWC and CEA.

Geological and Geo-technical investigations/studies are carried out for the Dam foundation based on field investigations and lab testing and are examined and cleared by Geological Survey of India (GSI), a Government of India agency. The geological and geotechnical aspects are taken into account during the design of structures as per codal provisions for ensuring the stability and safety of the dams.

Continuous real time monitoring of micro-earthquakes for the dam and reservoir area and measurement of earthquake in surrounding of project area is done by well equipped stations.

Since no dam failure has been reported in the country after 1983, apprehension expressed on the safety concern of dam due to earthquake based on earlier incidents of dam failures, may not be well founded. Dam and other structures are designed to sustain possible earthquake condition and there is no example where dam has failed due to earthquake in the last 35 years.”

CHAPTER IV

ISSUES IN DEVELOPMENT OF HYDRO POWER PROJECTS

4.1 The country is endowed with huge hydro power potential, however, only a fraction of it is being utilized at present. Despite the numerous benefits and compelling need of balancing power for grid stability, the pace of development of hydro power in the country has been sluggish. The Ministry have stated the following reasons/issues that hinder the growth of the sector and causes delay in commissioning of the projects:

(a) Land Acquisition

Land acquisition is a persistent issue involved in the implementation of hydro projects. Acquisition of land for various locations of the project such as Dam, HRT, Power House, Switch yard etc. delay the commencement/progress of works e.g. Koteswar, Parbati-III HEPs

(b) Environment and Forest issues

Three types of clearances are mandatory from three different wings of Ministry of Environment and Forest (MoEF) *i.e.* environmental clearance from Expert Appraisal Committee (EAC), Forest Clearances from Forest Advisory Committee (FAC) & Wildlife Clearances from National Board of Wildlife (NBWL). This makes the whole process very cumbersome which otherwise would be easier and less time consuming.

(c) Rehabilitation & Resettlement

Dislocation of the people from their houses/fields/workplaces etc. and their resettlement is a sensitive issue and involves a lot of time and money. Many times this issue leads to court cases resulting in delay in project execution/completion e.g. Koteswar, Maheshwar HEPs

(d) Law & order problem and Local issues

Protest by the local people against the construction activities, like blasting, muck disposal, etc. and also for various demands like employment, extra compensation, etc. often create law and order problems and delays the completion of works e.g. Uri-II, Subansiri, TLDP-III & IV HEPs.

(e) Cultural/Religious/Political issues

Religious sentiments attached with the rivers, cultural importance of rivers, lacks political traction due to long gestation period, Inter-State issues, especially over Riparian rights.

(f) Technical/Geological issues

Geological surprises resulting from weak geology in the Young Himalayan region, lack of technology to deal with weak geology, lack of major contractors with expertise in hydropower sector, natural calamities like landslides, hill slope collapses, road blocks, flood, and cloud bursts etc. are a cause of severe setbacks in construction schedules.

(g) Difficult Terrain & Poor Accessibility

Difficult terrain & poor accessibility of the hydro project site takes lot of time & money to develop/maintain the infrastructures like road, establishments, etc. causing the delay in completion of hydro projects.

(h) Inter-State issues

Sometimes Hydroelectric projects get delayed due to inter-State disputes between the States.

(i) Cumulative Basin Studies

The impact of recommendations of Cumulative Basin studies of different basins result in change in parameters such as FRL, Head and Annual Energy Generation etc. of hydro projects necessitating formulation of new DPR.

(j) High Tariff of Hydro Projects

Tariff from hydro projects tends to be higher compared to other sources of power (conventional as well as renewable sources) mainly due to construction of complex structures which have long gestation period, unavailability of loans of lower interest rate & longer tenures, high R&R cost, infrastructure (roads & bridges) cost etc. As such, many hydro projects even after commissioning are facing financial distress due to dishonouring of PPAs/non-signing of PPAs.

(k) Financing issues

High cost of Finance and lack of long tenure funding for hydropower projects.

(I) Levying of Water Cess

Levying of water cess by the States like J&K has also affected the viability of the projects and increased the tariff by about 50p-Re. 1/unit.

Land acquisition/R&R/Environmental Clearances

4.2 Land acquisition has been cited as one of the major problem by the Ministry in development of hydro power sector. When the Committee desired to know the steps taken by the Government to streamline the process, the Ministry have stated as under:

“Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 has been notified by the Government of India on 27.09.2013 which have more participation of local people in terms of Land Acquisition and Rehabilitation & Resettlement. The main objectives of the Act are given below:—

- To ensure a humane, participative, informed and transparent process for land acquisition with the least disturbance to the owners of the land and other affected families.
- Provide just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition.
- Make adequate provisions for such affected persons for their rehabilitation and resettlement.
- Ensure that affected persons become partners in development leading to an improvement in their post-acquisition social and economic status.”

4.3 Rehabilitation and resettlement issues are cited as one of the main hindrances in the tardy development of hydro projects. When the Committee desired to know that in what manner these issues can be addressed so as to facilitate the process of hydro development in a time-bound manner, the Ministry in their written reply have stated as under:—

“The Government has framed/enacted a number of Policies and Acts like National Rehabilitation & Resettlement Policy, 2007, Right to Fair Compensation and Transparency in Land Acquisition and Rehabilitation and Resettlement Act, 2013, based on which project specific Rehabilitation & Resettlement Policy is formulated by project authority.

The salient features of Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 are as under:

- Resettlement and Rehabilitation benefits to all affected families (in addition to compensation) - Schedule II
- R & R Package - Choice of employment/5 lakhs/Rs. 2000 per month for 20 years
- One-time Resettlement Allowance: Rs. 50,000/
- Cattle shed/petty shops - Rs. 25,000/
- One time grant to artisan/traders/self employed - Rs. 25,000/
- Fishing rights in reservoir
- Land for land - Irrigation projects (as far as possible) 1 acre of land (2.5 acres for SCs/STs in command area)
- Land for Urbanization Purposes-20% of the developed land will be reserved and offered to the land losers.

Displaced Families

- Housing in case of displacement (those without homestead land and staying for 3 years) - Rural Areas (IAY specifications/ costs); Urban areas (constructed house not less than 50 sq.mts. in plinth area/min. Rs. 1,50,000).
- Subsistence grant for all displaced families - Rs. 3000 per month for one year (additional Rs. 50,000/ for SCs/STs).
- Transportation grant for all displaced families - Rs. 50,000/-.
- All monetary rehabilitation grants and benefits are adjusted based on the Consumer Price Index.

R&R plans are formulated and implemented by the State Government Proactive support and cooperation of the State is necessary of effective implementation of R&R plan. Non-availability of land records has also been one of the major reasons coming in the way of Land Acquisition and consequently R&R issues also arise due to multiple claimants.”

4.4 The Ministry of Power have stated that Environmental aspects involved in construction of hydro projects are being looked after by Ministry of Environment & Forest (MoEF) at the time of clearance of DPR and the projects are taken up for construction only after necessary clearances are accorded by MoEF. The Environmental Impact Assessment

(EIA) and Environment Management Plan (EMP) studies for the hydro projects is carried out by the project proponents as per the guidelines of MoEF. The Terms of Reference (ToR) for EIA study is got approved by the project proponent from MoEF at the Scoping Stage itself and the study area includes the catchment area, the submergence area and the projects appurtenances, area within ten km. from main project components *i.e.* dam, power house etc.

4.5 The Ministry of Power have informed the Committee that as on 31.10.2018, 30 nos. of Hydroelectric Projects aggregating to 23,424 MW concurred/appraised by CEA are yet to be taken up for construction and are pending due to Environment and Forest Clearance issues. The details are enclosed at *Annexure-IX*.

4.6 In regard to timeline for grant of various clearances and the efforts made to streamline the same, the Ministry of Power have stated that presently, the existing timeline for seeking Environment Clearance is 570 to 750 days. However, actual time taken in getting EC ranges from 1680 to 2160 days. Likewise, actual time taken for Forest Clearance Stage-I and Stage-II is 210 to 600 days and 270 to 750 days respectively. Ministry of Power is in discussion with MoEF to streamline the process of Environment Clearance and Forest Clearance.

4.7 The Ministry of Power have informed that afforestation has been made compulsory in the process of hydro power development to make up for the losses of denudation done for the projects. When the Committee asked as to whether compulsory and compensatory afforestation is adding to the problems and how this provision can it be amended suitably so as to strike a balance between afforestation and development of hydro power, the Ministry in their reply have stated as under:—

“Non-availability of land for compensatory afforestation, sometimes, causes delays in the project implementation. As such, there is need to identify the areas where such activities could be carried out by the project developers without delaying the project. It is suggested that State Government or concerned Environment Ministry could be entrusted with the work relating to Compensatory Afforestation for which necessary funds are provided by the project developer.

Keeping in view of the ground realities, alternatives measure such as identification of land for compensatory afforestation in other States/ creation of land bank may be made by the Forest Department in advance so that individual hydropower projects are not delayed, especially in Arunachal Pradesh, where the forest cover is more than 80% of the total geographical area.”

Financing issues

4.8 On being asked by the Committee about the per mega watt installation/development cost of any typical power plant the Ministry have stated that Typical per megawatt cost of new Coal Based Thermal Power Plants comes around Rs. 8 Crs./MW (details enclosed at *Annexure-X*) whereas typical per megawatt cost of Hydro project varies widely with average value of around 10 Crs./MW. Details of the cost of Hydro Electric Schemes recently concurred by CEA are given at *Annexure-XI*. However, the development cost of the project estimated at the time of concurrence is usually lesser than the actual expenditure incurred on the development of the project. The actual cost of the Project is determined after tendering which may further vary, due to various reasons e.g. delay in commissioning of the project, price escalation, addition/deletion of components, change in design/scope, over/under provision, exchange rate variation and other avoidable and unavoidable causes during construction of the project.

4.9 When the Committee further probed whether the initial/upfront cost of development is a true indicator in the long run, the Ministry have stated as under:—

“Generally, higher installation cost leads to higher tariff in initial years. However, installation cost is not a true indicator in long run due to reasons such:

- Economic life of plants based on various technologies is different. For example, economic life of hydro stations is considered as 35 years, whereas that of thermal stations is considered as 25 years.
- The energy benefit from plants based on different technologies is different. For example, coal based thermal stations can operate almost at full capacity consistently subject to availability of coal, but hydro stations generally operate at full capacity during monsoon months; during other months they operate only during peak hours.
- Variable cost of coal based stations increase over the years due to increase in cost of coal and cost of transportation.”

4.10 In regard to financial sources for developing hydro power projects, the Committee was informed by the Ministry that a typical hydro stations is financed based on the debt/equity ratio of 70:30. The 30% equity has to be managed by developers either from own resources or from public/private placement including IPO. The 70% loan can be

taken from various sources like Scheduled Commercial Banks, Financial Institutions like PFC or issues of Bonds. The foreign loan is generally available from institution like World Bank, Asian Development Bank (ADB) etc. and is generally availed by PSUs/CPSUs since Gols guarantee is required.

4.11 On being desirous to know whether the funds are readily available for hydro power projects or there are constraints, the Committee was informed as under:—

“That in case of projects developed by PSUs/CPSUs, the availability of domestic loan is generally not an issue. However, lenders carry out their own exercise of due diligence before deciding to finance any project. In some cases, after releasing part of the loan, the lenders may stop disbursing further loan due to reasons such as inability of promoters to deploy requisite equity, unsatisfactory physical progress of the project, time & cost overruns etc.”

4.12 When the Committee asked about the rate of interest on the loan being provided to hydro power projects, the Ministry have stated as under:—

“Basically interest on loan depends upon the rating of the developer irrespective of type of the project. At present, CPSUs like NTPC, NHPC, POWERGRID, SJVN, NEEPCO, THDC & others are likely to get domestic loans at the interest rate of around 8.5% per annum (close to SBI one year MCLR). However, in case of private developers, the interest rate may be anywhere around between the 10% to 13% depending upon the developers rating as most of the Banks charge margin over their MCLR rate. The interest rate on foreign loan depends upon the sources of loan and currency and it may be in the range of 0.50% to 5% per annum.”

4.13 When the Committee desired to know as to how loan at lower rate of interest can enhance their viability, the Ministry in their written reply have stated as under:—

“A typical hydro station is financed based on the debt/equity ratio of 70:30. The loan component (70%) forms the major portion of the total investments and if long term, low interest financing options are made available, it would enhance the viability of the project.

Considering the interest rate of 10% for a typical hydro project with a capital cost (including IDC) of Rs 10 crore/MW, the first year tariff and levelised tariff works out to around Rs. 6.60/kWh & Rs. 6.00/kWh respectively. If interest rate reduces by 4% (either through subvention or by other means), the capital cost of the same

project would be reduced to Rs. 9.2 crore/MW due to reduction in IDC component. With this, the first year and levelised would come down to about Rs. 5.35 Wh and Rs. 5.15/kWh respectively. Thus, cheaper financing is the major factor to enhance the viability of hydro project.”

4.14 In regard to availability of loans at cheaper rates from international institutions to these projects, the Committee was informed that Loans can also be availed from International Institution like World Bank, Asian Development Bank (ADB) etc. Such loans are generally availed by PSUs/CPSUs since Gols guarantee is required. The interest rate on foreign loan depends upon the sources of loan and currency and it may be in the range of 0.50% to 5% per annum. However, since these loans are in the foreign currency, there may be additional implication in the form of exchange rate variation. The Green Bond market could also be tapped to finance hydro projects.

4.15 On being asked by the Committee, the Ministry have furnished the details of the fund inflow from the international institutions during the last 10 years which is as given under:—

| Project | Latest Approved cost (Rs. Crs) | Foreign Loan | Interest Rate |
|---|--------------------------------|--|---------------|
| Pare Hydro Electric Project (110 MW) in Arunachal Pradesh by NEEPCO | 1337.76 | 80.00 million Euro (Sanction in 2008) | 4.66% |
| Rampur HEP (412 MW) in Himachal by SJVN | 4233.21 | 400.00 million US\$ (Sanction in 2008) | 0.75% |
| Visnugad Pipalkoti HEP (444 MW) in Uttarakhand by THDC | 2491.58 | 648.00 million US\$ (Sanction in 2011) | 4.39% |
| Tehri Pump storage (1000 MW) in Uttarakhand by THDC | 4401.90 | 83.87 million Euro (Sanction in 2015) | 1.80% |

*However, this list may not be exhaustive.

4.16 When the Committee asked about the specific efforts that have been made by the Government during the last five years to provide long term fund at lower rate of interest to hydro power projects, the Ministry replied as under:—

“The Government included a provision (Para 5.8)in Tariff Policy, 2016 stipulating that the Appropriate Commission shall provide a suitable regulatory framework to incentivise the developers of Hydro Electric

Projects (HEPs) for using long-term financial instruments in order to reduce the tariff burden in the initial years.

Recently, Government financial institutions like Power Finance Corporation (PFC) and Rural Electrification Corporation (REC) have started to provide the financing of loan for tenure more than 20 years. The Ministry is engaging with Bankers and Financial Institutions to make low cost funding available for Hydro developers.”

4.17 However, in regard to long tenure financing to hydro power projects, the Secretary Power also stated before the Committee as under:—

“Lenders say that to Government companies we are willing to lend for 18 years but not to the private people. It is too long a period.”

Issues pertaining to State Governments

Arunachal Pradesh

4.18 During the examination of the subject the Committee raised the issue of the State of Arunachal Pradesh, wherein, despite having the maximum hydro power potential only a meager capacity of 515 MW is actually been utilized at present. When the Committee inquired as to why the hydro power potential in the state of Arunachal Pradesh is not being harnessed, the Secretary, the Ministry of Power explained as under:—

“There is hardly any development because a large number of projects were awarded in 2008 and 2009 at a certain premium without any bidding for hydro projects. There was no bidding. These are MoU-based projects, leaving aside a few where some work was done and construction has taken place.....

Water is a State subject. So, the State has to allot a project. We are dependent on it, and we cannot take initiative on our own. We need this Committees support that the Government of India should support financially the building up of shelf of projects for which they should do survey and investigation. The project can be done by anybody. If the State Government wants to do it, then let them do it. But somebody should start survey and investigation, and somebody has to invest that money initially without any return may be because we do not know when the project will come up.”

4.19 The Committee also pointed out the issue of hydro power projects which has though been allocated for development are stuck due to inability of the developer to do so owing to various reasons. The Committee,

therefore, desired to know whether such projects can be taken back for reallocation, the Ministry in their reply have stated as under:—

“Hydro power policy as notified on 19.11.2008, by the Arunachal State Government has a penal provision for delay in commissioning of the project, if the delay is beyond the control of developer. However, the acquisition of the project from the developer can be determined on case to case basis, depending upon the condition laid down in the MoU signed/LOI issued by the State Government.

As per a typical MoU signed between the developer and the State Government of Arunachal, there are provisions which *inter-alia* include the conditions for termination of the Agreement as reproduced below:

In the event of stoppage of the construction works of the Project by the Company, for a period of more than 12 (twelve) months for reasons not covered under Force Majeure or for reasons attributable to the Company and/or abandonment of the Project by the Company to resume the work, have the right to terminate the Agreement. In the event of termination of the Agreement under this clause, the Govt. of Arunachal Pradesh shall have the right to take over the Project on “As is where is” basis and no claim of the Company shall be entertained. The Govt. of Arunachal Pradesh shall also have the exclusive right to re-allot such project to any other developer.

In view of above, it appears that the provision to invoke to get back the project from developers already exists in the agreements signed with the developers.”

Himachal Pradesh

4.20 The Status of hydro power potential in Himachal Pradesh is as under:—

| | |
|--|-----------|
| Total identified Hydro Power Potential | 27,436 MW |
| Harnessable Potential | 23,500 MW |
| Harnessed so far | 10,547 MW |
| Foregone Potential | 755 MW |
| Construction Stage | 1,885 MW |
| Clearances/Investigation Stage | 9,136 MW |
| To be Allotted | 1,364 MW |

4.21 The representative of the State Government of Himachal Pradesh stated before the Committee as under:—

“Himachal Pradesh, hydro power is the mainstay and we are very concerned about the problems in the Hydro sector. So, we have divided the issue into two parts – what we can do and what we can request the Government of India to do. So, we have decided to go ahead as to what we can do. We have done many things in the last eight to nine months. The most important thing at the moment is, given the fact that the initial cost is very high and the gestation period is very long, the State Government has come up with the policy intervention saying that the 12 per cent free power which was to come in the first twelve years will get deferred. This itself is a very big motivation and I can see that there is a turning point in some of the projects because of this. Other than this, we have also decided that for future projects, it will be 12 per cent throughout. There will not be incremental slab after a time period. That is also a very strong message of the State Government to actually encourage the Private Sector and the other Sectors. The premium has been reduced to Rs. 1,00,000 per megawatt and we are giving the Government land only at Rs. 1. All this has come down drastically so as to reduce the cost which we can reduce. Another very important thing which the State Government has recently done is that we have now taken a decision that all the power generated by the projects up to 25 megawatts, will mandatorily be purchased by the Himachal Pradesh State Electricity Board Limited (HPSEBL). This is also a very big move and this has actually given a new life to the small hydro projects. So, the worry, as to who will purchase the electricity has been actually addressed to a large extent. Other than that, we have also decided that the tariff determination will be from the date of achieving COD instead of signing of the IA. The Open Access Charges for project having capacity up to 25 megawatts have also been exempted. We are also redefining the milestones and we have also allowed the allocation of projects up to 10 megawatts for captive use. So, this is what the State Government has done. But still, there are some issues and we are in dialogue with the promoters, both small and the big. As I was telling you, we have divided the issue into two parts – what we can do and what we can request the Government of India to do. So, the State Government will definitely do because as said earlier, this is something of high importance to Himachal Pradesh. We have a huge wish list. If you permit us, let us start with it. The first thing which we would like and which you had also mentioned that will take care of various attendant issues is that if we can declare the entire Hydro Power Sector as a Renewable

Sector. I think that it is logical, historical and we must push it. With the support of the Committee and the Ministry, if it happens, the sooner, the better. We are hearing it for a very long time and I wish it would happen fast.”

4.22 He further added:—

“The second issue is that the projects up to 25 megawatts have been declared as linear projects. So, there is no reason of why the projects of beyond 25 megawatts should not be declared as linear projects. The definition of linear does not depend upon the capacity. It depends on how the projects travel across area. If it is done, then to a large extent, the problem of FRA, which the Secretary also mentioned will get resolved because the stringent provisions of FRA will get diluted. It is not our purpose to subvert them. Our only purpose is to get them more liberalized. If the definition of linear projects is extended to all hydro projects, it will definitely fast-track these projects.

Another thing which we would like to mention is that the NPV of the small hydro projects up to 25 megawatts has been reduced. Actually, we are trying to say that the distinction of the hydro projects on the megawatt to a large extent is artificial. Hydro Sector projects have two dimensions. Firstly, there are discriminations on larger hydro projects. The other is the discrimination *vis a vis* solar. So, let us first resolve the discrimination which exists between the hydro projects on the basis of their capacity.

Recently, the Government of India has allowed the delegation of powers to State Government for one hectare land. We welcome it. But we still feel, if it could be extended up to five hectares, it will be better for us... we should also have hydro power purchase obligation. This will probably give new lease of life to the Hydro Sector.”

4.23 In regard to probable issue that might crop up in case of implementation of Hydro Power Obligation, the Secretary Power, deposed before the Committee as under:—

“The trajectory issue would come. Today, the trajectory covers solar power and non-solar power in the renewable side. Once we add this volume to that, the trajectory will have to change. At this stage, the only comment would be that DISCOMS should not be burdened with forced buying of power. Hydro power is essential. People would buy it in the evening hours at a higher tariff also. Only perhaps what we need to look at is the time of the day tariff systems to be brought

in so that these energies can be sold when the demand is high. We are working a policy on that separately. Of course, this topic was debated but somehow it has not gone through till now.”

Uttarakhand

4.24 In regard to status of development of hydro power projects, the representative of the State Government of Uttarakhand state before the Committee as under:—

“Uttarakhand has a similar potential as that of Himachal Pradesh but they sell power worth thousand crores every year and we buy power worth one thousand crores every year. This is primarily because we are the originator of the holiest river of the country call the Ganges. Because of the river Ganga being in our State and the Bhagirathi Eco Sensitive Zone, there are ‘n’ numbers of restrictions on us by way of court orders, NGVRA, Ministry of Water Resources which have completely stalled the sector for us. Uttarakhand is one State which depends only on hydro and to some extent on religious tourism primarily. The State is in distress in terms of this sector being at a stalemate.”

4.25 In regard to issue of Environmental flow (E-flow) of the river, the representative of the State Government of Uttarakhand state before the Committee as under:—

“I would like to put forth to the Committee that Uttarakhand was the first State to issue Government orders ensuring 15 per cent of e-flows which were defined by the National Green Tribunal which said that we should actually ensure a minimum of 15 per cent. So, our Government, in the interest of rivers and ecology, said that we will ensure 15 per cent e-flows.

There was an expert body which was constituted by the Ministry of Water Resources which said that these many projects with around 4000 megawatts are not ecologically sustainable. Our State Government agreed to forego that which actually meant a huge loss of 4000 megawatts but we are absolutely okay with it as we understand the sanctity of river Ganges and the Bhagirathi Zone. But even after doing these two things also, there has been no relief for the State Government to go ahead with this project.

I would like to mention one point here and we have been talking about it with both the Ministries. Though the allocation of business says that the development of hydro sector would be in the Ministry

of Power, the Ministry of Water Resources says that they would decide the e-flows. There was an order by the Ministry of Water Resources saying that until and unless the e-flow would be decided by them in this particular zone, no project would be sanctioned.

Recently, on 9th of October, the Ministry of Water Resources decided that the e-flow would be 20 to 30 per cent, which is extremely huge. If we were to implement the NGT Order, we would lose about Rs. 120 crore per annum with our existing potential; forget about the potential which we need to develop. But as far as this particular Order is concerned, it would make Hydro Sector completely unviable. This Order of the Ministry of Water Resources particularly applies to the upper reaches of the Ganga basin. So, Uttarakhand is one State which is going to be adversely affected by this Order.....we would like to flag it over here that e-flows, which are decided by NGT and the expert body of Ministry of Environment, Forest and Climate Change should be kept to 15 per cent. We are ready to follow it. But 30 per cent would actually take the tariff higher, approximately by Rs. 1.25, which would make PPAs absolutely unviable. So, the whole idea of having hydro for grid stability, for a permanent solution for green energy will actually be defeated. Solar energy, wind energy or any other form of renewable energy is always going to be smaller. For us, as a State in the Himalayas, hydro is our main stake.”

4.26 It was further stated:—

“Our actual capacity estimated earlier was around 25,000 megawatts. We did a realistic re-assessment and we are talking about a capacity of around 18,000 MW. Our developed capacity is around 4,000 MW. Our capacity under construction is around 1,640 MW and this is something miniscule. So, what we need to develop is around 12,500 MW.”

4.27 When the Committee sought the views of the Ministry of Power in regard to the issue related to Uttarakhand, the Secretary deposed before the Committee as under:—

“We definitely are with Uttarakhand and we have been trying to resolve that issue at the highest level. Ministry of Power and Environment Ministry have been agreeing, rather than through filing affidavits in the Court and the Supreme Court when looking at a different affidavit from Water Resources Ministry, the Government cannot have different views, so come back with a common affidavit which we have not been able to arrive at. We definitely would like to exploit the potential with the States. The States need to be proactively involved with our projects.”

4.28 When the Committee sought the clarification regarding an apprehension among the people after the huge flood in the State of Uttarakhand, that hydro power projects are responsible for the landslides and floods, the representative of the State Government of Uttarakhand state before the Committee as under:—

“We had technical committee reports, multi stakeholders committees, which said that the Kedarnath tragedy was not because of any project as there was no project in that upper reaches. That was a phenomenon which was one of a kind. In fact, because of the Tehri Dam, the lower reaches of Rishikesh and Haridwar actually got saved. If that dam would not have been there, with the kind of discharge which happened, the lower reaches of Rishikesh and Haridwar would have faced huge damages. In fact, that actually helped the lower plains of our State.”

4.29 It was further added:—

“जो अविरल गंगा की बात है, जब तक टिहरी का डैम नहीं था, तब ऋषिकेश में एक समय में पानी बहुत कम हो जाता था और धारा बहुत छोटी हो जाती थी। आज वह डैम बन गया है तो जब वहां लीन सीजन में पानी की जरूरत होती है तो पानी छोड़ देते हैं और हर तरह की होली ऐक्टिविटी के लिए पानी उपलब्ध हो जाता है।”

Jammu & Kashmir

4.30 In regard to status of development of hydro power in the state, the representative of the State Government of Jammu & Kashmir stated before the Committee as under:—

“We have four large basins namely, Chenab, Indus, Jhelum and Ravi. So, identified potential is 16,475 MW out of which we have commissioned 3,200 MW projects. This comes to roughly 20 per cent of the identified potential. But there are four major players in Jammu and Kashmir.

The larger projects are manned by NHPC. They have developed and commissioned roughly 2000 MW projects there and 1200 MW has been developed by the State Power Development Corporation. We have a small portion of independent power providers. The total capacity of IPP which has been commissioned as on date is just 40-42 MW. We have one corporation of joint venture which is between the State Government and NHPC. They are now developing a few projects. As I said, 3200 MW projects have been commissioned and 8000 MW projects are in the pipeline. They are at different stages

of development, but as said by both the State Government officials, there are problems in developing these projects because the projects are commercially non-viable in most number of cases. They are capital-intensive. We have to raise a huge capital initially and because of the long gestation period, return comes very late. So, State Government has come up with a policy that we are giving four or five incentives to these projects. Firstly, we are giving exemptions from the local taxes and toll taxes during the construction of the project. Secondly, there is obligation of providing 12 per cent free power to the State. So, we have exempted these projects for the initial 10 years for providing this free power. That becomes a huge concession. Thirdly, the J&K Government imposes water usage tax. So, we grant concessions for initial 10 years to these projects. Fourthly, the Government land which is coming under these projects is provided free of cost. Fifth one is that we enter into the PPA with the project and we give guarantee to purchase almost 50 per cent of the power from the project. So, all these things make the projects somehow viable. But at the same time, we request that in these projects, Government of India should also grant some incentives to make the power saleable.”

4.31 It was further added:—

“The second thing is that my request would be that the hydro-power projects should be considered as renewable energy. All the hydro power projects, particularly run of the river projects should be considered as hydro power projects. We largely have run of the river projects. We do not store the water and to make hydro power project viable, there should be some hydro power purchase obligations on the States, say 20 per cent of the power should be bought from the hydro power projects. Another thing is that once this is declared as renewable energy, then we should allow the States to use hydro power generation as tradable, renewable energy obligations. That will also make these projects viable.”

Mizoram

4.32 The representative of the State Government of Mizoram have stated before the Committee:—

“The issue of environment and forests clearance is linked with the Supreme Court’s order and we cannot do anything at this moment unless we appeal to the Supreme Court. The State Government is of the opinion that because the State has got 89 per cent area under forest, so, anything or any project coming up in the forest area

would involve the forest approval. So, the State Government is not having sufficient funds and resources to somehow start the process of taking up hydro projects. We are of the opinion that, through this Committee, we should appeal the Government of India, along with the Power Ministry, to move to the Supreme Court to exempt these hydro projects from the charges of Net Present Value (NPV), CA and catchment area treatment plan etc. This could be one of the solutions.”

Environmental and Clearances issue

4.33 When the Committee pointed out that public hearing is part of DPR, however, it has been seen in many projects that even after finalization of DPR- at the time of the start of the project there is public hue and cry and agitations. The Committee desired to know that when public hearing has supported a project, then why it happens and whether the report submitted by the Collectors on public hearing is just to support the project. The Secretary Power explained the matter before the Committee as under:—

“What we heard generally is that suppose water submergence is up to a certain level and so these are the people who will get affected and they will get their compensation and all and they are the people who are not opposing generally. The next level people who are not going to get anything because they are not losing any land or home are the ones who are the part of the village, same Gram Panchayat, they are the ones who come and create troubles. This is a general complaint. I should not be generalizing it but by and large it comes like that in many cases.”

4.34 The representative of the State Government of Himachal Pradesh further elaborated this as under:—

“I would further like to take what the Secretary has said. More often than not, extraneous considerations are becoming an impediment. Notwithstanding approval in public hearings, they are still some vested groups and when we discuss this problem in the States, we are aware that there are groups which have developed an expertise in these matters. This would need a political solution. The present Government is very much aware of it and for us, it is a matter of great concern. The solution to a large extent has to be at the political level which, I am sure, will travel down to Himachal Pradesh.”

Projects of NHPC

4.35 When the Committee asked for the details of the hydro power projects which are facing issues in their development, the CMD, NHPC

stated before the Committee as under:

“We have a project called Teesta IV in Sikkim. The DPR for the project was done by us in 2010, and it is a coincidence that the Mangdechhu Project in Bhutan – that we have done already—was also appraised in 2010 itself. But the Mangdechhu Project in Bhutan is going to be commissioned very soon whereas Teesta IV has not started, and the reason for that is we could not get the requisite clearances in time and also the FRA could not be done. This is where the State Governments have become much more important. We are not able to hold the meetings on one pretext or the other. So, with great difficulty now we have come up to the level that in all the then GPUs the meetings have been held, but out of these ten GPUs only in two GPUs 50 per cent people have said that they do not want the project whereas in eight GPUs almost 100 per cent people have said that this project must come up. Now, we have done Teesta V in Sikkim, which is just downstream of this planned project, and I can say with great pleasure and confidence that after we have done Teesta V project, the entire population of Sikkim has seen what these ‘developmental engines’ as we call them can do for the State. The Singtam town, which was a small village, is a fully flourishing big town now, and still Teesta IV is not starting because of lack of support from the State Government. We are maintaining establishment there for quite some time and there are times when we are forced to think whether we should keep our establishment there or withdraw because with each passing day the project becomes costlier and tariff may not become viable on the appraisal standards.

4.36 In regard to Subansiri Project in Arunachal Pradesh, he stated:

“It is on the border of Arunachal and Assam as one bank lies in Arunachal and one in Assam. It was slated to be the biggest project of our country of 2,000 MW. We have done almost 50 per cent work on the project, and as is well known that this project was stalled by local pressure groups in December 2011 following which the case was taken to NGT. The NGT has heard the case for two years and in 2017 they have given the decision, and the crux is that they did not oppose the project and the only thing said is that downstream some gaps were there that should have been studied. Let me also say that the Subansiri Project was studied by a number of Committees at the Government of India level also, and this despite the fact that the project was started after getting all the clearances and fully appraised by all the agencies as required in the country. We are incurring an IDC of Rs. 1.5 crore and if power aspect is also included, then about

Rs. 12 crore. So, this has taken the tariff of the project to such levels that it might become unviable very soon. Hence, we have been requesting the State Government to please help us so that this work can be started. Now, after the NGT gives a verdict, I think that still we will have to take the support of the State Government without whose support we cannot restart the project.”

4.37 He further stated:

“The third project is Parbati II Project in Himachal Pradesh. This project was a very complicated and a very intricate project, and we started it in 2002. Just one component of the project, which is about 30 km. long tunnel out of which only 3 km. is stuck because of geological reasons. There is a tunnel boring machine that has been put there and we are trying to see that it is revived. All kinds of methodologies we have employed including removing the original contractor and employing another contractor on his behalf, but still the progress in the project is slow in the sense that if we require about 200 m. a month, we are not able to do more than 50 m. a month from one phase. So, the project has got delayed, but it is not stuck that way. We are still continuing the work as the contractors are in place. The fourth project is Dibang, which is under consideration only. It is a 2,880 MW project and it lies on river Dibang, which is contributing about 15 per cent to the flood of Brahmaputra. So, if we see that way, the flood moderation that is happening in Dibang will reduce the flood damages in Assam to the extent of almost 50 per cent roughly speaking. This is a project that is having 278 m. high dam, and considering the fact that Subansiri is only 116 m. high dam and the issues of seismicity in that area was one of the pretexts on which this project was stopped, similar thing can happen to Dibang also. So, we are still hoping that people will see reason. We have tried to explain to people. We have had workshops in Subansiri area and we have held workshops in consultation with Dibang people also and hope that they will see reason. Otherwise, under the guise of public opinion, which actually is not exactly the opinion of the public, some other issues come in and the projects are stopped. So, we are having a big problem as financial liquidity issues are coming up now as these projects are stuck or the contractors are running away. The contractors cannot hold on for so long there in that area. These are the factors which were not there when we awarded the contract.”

4.38 In regard to work done by his organization, the CMD, NHPC stated before the Committee as under:

“As of now, we have done 22 projects which is totaling 7,071 MW. I can say with pride that in the areas where these projects are located, we see backward people, Scheduled Tribes people mostly

have immensely benefitted. So, if we see the benefits which these projects have given, and if that development is monetized in some manner, the comparative cost of hydra is very much within our limits. If we see NHPC, we have 22 projects including our subsidiaries, we are generating at an average cost of Rs. 3.6 because all the old projects have already recovered their cost and the projects which are very old are generating at as low as Rs. 1.12.”

4.39 In regard to issue of water cess levied by some of the States, he stated:

“The other issue which is coming up is possible through tariff but the States are asking for water cess for each cubic meter of water we used, it is not a consumptive use. We are just using it, in a sense, water comes, it passes through the machines, and go to the river again. In one river, we have got four projects. We are paying water cess in one project. Same water is coming; it is not a consumptive use, but it is making all the costlier. That is one reason that hydro project appears to be costlier but it is not costly *per se*.”

4.40 In regard to provision of 12% free power to the State Government, CMD, THDC stated before the Committee as under:—

“We pay 12 per cent free power to the State Government. In no other power, we see like this - for example, wind, solar. These are also the natural resources of the State but we don't pay. Even if you pay, this 12 per cent comes once the project is commissioned. My request is, why not from the beginning when the project is started. The things like Local Area Development Fund (LADF); the things like free power. Part of this may be made LoT to be paid to Project Affected Families (PAFs) right since beginning so that they get something apart from compensation.”

4.41 In regard to issue of free power, the Secretary, Power further added as under:

“When we give 12 per cent of free power, there is one per cent given by the Government of India and one to be contributed from the States share of 12 per cent. We call it LADF, the Local Area Development Fund. In some States, guidelines have been issued for using this Fund for the benefit of people who are affected. In other States, the money goes into the Governments Consolidated Account, and on how it should be spent, guidelines and committees are not in place....

Regarding free power....it should be done after six years of commissioning. Project will deprecate; some payments must have been made to banks. After that, this would come down, and free power can come. We were saying that right in the beginning when power is generated, we should give to the local people.”

Private Sector Participation

4.42 When the Committee desired to know the reasons for very less participation of private entrepreneurs in the hydro sector, the Ministry have stated as under:

“In the early 1990s, the power sector was opened for private sector participation mainly to bring in additional resources. Subsequently, a large number of hydro projects were allotted by the respective State Governments for implementation in private sector. However, in spite of a number of policy measures and initiatives taken by the Government to accelerate the development of hydro power in the country, the performance of private sector in hydro power sector leaves much to be desired.

High construction cost of Hydro Projects, cost escalation due to longer gestation periods, R&R issues, land disputes, law and order issues, lack of long term finance, difficulty in signing of long term PPAs, obtaining environmental and forest clearances and geological uncertainties, lack of enabling infrastructure like roads and bridges, judicial challenges to clearances already granted, lack of funding for flood management component etc. are some of the reasons making investment in hydro power development less attractive for private participation.”

4.43 The Committee pointed out that the States have expressed their opinion that in the given circumstances the private players will not be able to implement the project. The Committee, therefore, asked the Ministry whether Central PSUs would be in position to take up those projects. While replying to this the Secretary, Power deposed before the Committee as under:

“Very much, rather, we have four PSUs and all of them are sitting here. They will agree with me that they are underworked. They do not have too many projects to undertake. State Governments have to agree to give and we are willing at a joint venture model also. J&K explained about Chenab Valley Power Project. One project is under implementation; two are under approval. Some more are under discussion on JV model. If the States do not have resources of their own, it can be implemented on commercial terms.”

4.44 On being asked by the Committee about the initiative taken by the Government to give impetus to the development of hydro power sector, the Ministry have stated as under:

“The Government has taken several policy initiatives to tap the hydro potential and to boost hydro power development in the country. The details are given below:

(i) National Electricity Policy, 2005: Salient Features

- The policy lays maximum emphasis on full development of the feasible hydro potential in the country which will facilitate economical development of States, particularly North Eastern States, Uttarakhand, Himachal Pradesh and Jammu & Kashmir.
- Full support of Central Government has been extended for hydel development by offering the services of CPSUs like NHPC, NEEPCO, SJVNL, THDC etc.
- Since the hydel projects call for comparatively larger capital investment, debt financing of longer tenure has been recommended.
- The State Governments have been advised to review procedure for land acquisition and other approvals/ clearances for speedy implementation of hydro projects.

(ii) Hydro Power Policy, 2008

- Transparent selection procedure/criteria to be followed by the States for awarding sites to private developers.
- The dispensation regarding exemption from tariff-based bidding, available to the Public Sector under the National Tariff Policy 2006, also extended to private sector hydroelectric projects up to January 2011 (since extended up to 15.08.2022 in Revised Tariff Policy, 2016).
- To enable the project developer (public as well as private sector hydro developers) to recover the costs incurred by him in obtaining the project site, the policy allows a special incentive to the developer by way of merchant sale of upto a maximum of 40% of the saleable energy.
- An additional 1% free power from the project (over and above 12% free power earmarked for the host State) would be provided and earmarked for a Local Area Development Fund, aimed at providing a regular stream

of revenue for income generation and welfare schemes, creation of additional infrastructure and common facilities etc. on a sustained and continued basis over the life of the project.

- Developer to provide 100 units of electricity per month to each Project Affected Family - in cash or kind or a combination of both for 10 years from the COD.
- Developer to assist in implementing rural electrification in the vicinity of the project area & contribute 10% share of the State Govt. under the RGGVY scheme.

(iii) National Rehabilitation & Resettlement Policy 2007

(iv) Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013

(v) Tariff Policy, 2016 (Portions relevant to Hydro power)

- Intent of Government for promotion of HEP emphasized in the objective of the Policy - “To promote HEP generation including PSP to provide adequate peaking reserves, reliable grid operation and integration of variable RE sources”.
- Hydro power to be excluded for estimating Solar Purchase Obligation.
- Certainty of long term PPA for min. 60% of capacity, balance through merchant sale –Provision for extension of PPA beyond 35 years for a further period of 15 years.
- Enabling provision for suitable regulatory framework incentivizing the developers of HEPs for using long term financial instruments-in order to reduce tariff burden in the initial years.
- Depreciation - Developer shall have the option of charging lower rate of depreciation *vis-a-vis* the ceiling determined by CERC.
- Exemption from competitive bidding extended up to 2022.

(vi) A proposal ‘Measures to promote Hydro power sector’ is under consideration of Government.”

PART II

OBSERVATIONS/RECOMMENDATIONS OF THE COMMITTEE

Hydro Power as Renewable Energy Source

2.1 The Committee note that as per the present policy, hydro power plants upto 25 MW capacities are considered as renewable energy sources and are under the purview of the Ministry of New and Renewable Energy, whereas, hydro power plants having capacities more than 25 MW are considered conventional energy source and are dealt with by the Ministry of Power. The Committee, during the examination of the subject found no logic behind segregation of hydro power into renewable energy and conventional energy on the basis of its capacity. It had been learnt that hydro power is a clean and green source of energy and as compared to conventional thermal power source, have negligible carbon foot prints. The Committee note that the Green House Gas Emissions from Hydro Power is 4-10 Gram CO₂/kWh which is even lesser than that from Solar Power i.e. 38 Gram CO₂/kWh. In case of coal based thermal power it is 957 Gram CO₂/kWh.

Even, the Ministry of Power, in regard to such segregation of hydro power on the basis of its capacity have stated that all hydro projects are traditionally renewable in nature. Since Hydro Power projects upto the capacity of 25 MW stands allocated to Ministry of New and Renewable Energy (MNRE) (Initially Ministry of Energy, later bifurcated to Ministry of Non- Conventional Energy Sources, which was finally renamed as MNRE in 2006), only these are categorized as renewable energy source. Thus, the categorization was on the basis of allocation of work and not on the renewable nature of source. In regard to declaring all hydro as renewable, they have stated that one of the measures formulated by Ministry of Power in the proposal for “Revival of Hydro Power Sector” includes declaring all hydro projects as renewable irrespective of their size and capacity. The proposal is presently under advanced stage of inter-ministerial consultations. During the examination of the subject, the Committee found that declaration of all type of hydro as renewable energy source is the common and long standing demand of the State Governments/Project Developers. The Committee also find this demand genuine and logical, therefore, they strongly recommend that all type of hydro power

should be categorized as renewable source of energy as soon as possible. The proposal in this regard which is under inter-Ministerial consultations should be expeditiously finalized.

(Recommendation Sl. No. 1, Para No. 1)

Clearances Issues

2.2 The Committee observe that land acquisition for hydro power projects are becoming difficult day by day. During the examination of the subject the Committee found that the process of land acquisition is time consuming and fraught with many uncertainties. The Ministry have also stated that the land acquisition is a persistent issue involved in the implementation of hydro projects. Acquisition of land for various locations of the project such as Dam, Head Race Tunnel (HRT), Power House, Switch yard etc. delay the commencement/progress of works. The Ministry have stated that to streamline the process Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 has been notified by the Government of India on 27.09.2013 which have more participation of local people in terms of Land acquisition and Rehabilitation & Resettlement.

The Ministry have also enumerated various benefits which are provided under Resettlement and Rehabilitation (R&R) to all affected and displaced families in addition to compensation. It is learnt that the real problem lies in the execution of land acquisition and implementation of Resettlement & Rehabilitation schemes for which District Administration is responsible. The Committee find that the District Administrators are entrusted with plethora of work, therefore, they have limited time. Further, owing to complexity of the matter, often there are cases of delays and unresolved issues in the land acquisition and Resettlement & Rehabilitation process.

The Committee during their study visits and discussions with the representatives of the various State Governments, have realized that District Administration plays a key role in resolution of issues related to land acquisition and R&R. Without cooperation of District Administration, it is difficult for the projects to meet their timeline. The Committee note that there are several cases of time overrun in case of hydro power projects, which have resulted in massive cost escalation. The Committee, therefore, expect that the District Administration, wherever, the hydro power projects/potential lies, will actively participate and do the needful to expedite the matter of land acquisition and R&R process related to hydro power projects to

provide fair deal for the affected people as well as to fast track the hydro power projects. The Committee also recommend that the Central Government, the State Government(s) and the Developer of the Projects should co-ordinate and cooperate with the District Administration in this regard.

(Recommendation Sl. No. 2, Para No. 2)

2.3 The Committee note that three types of clearances are mandatory from three different wings of Ministry of Environment and Forest (MoEF) *i.e.* environmental clearance from Expert Appraisal Committee (EAC), Forest Clearances from Forest Advisory Committee (FAC) & Wildlife Clearances from National Board of Wildlife (NBWL). This makes the whole process very cumbersome which otherwise would be easier and less time consuming. The Committee are of the view that there is a need to strike a balance between the development and the environment as both are important for the country. The Committee definitely want that hydro power projects be developed only after due consideration and assessing their impact on environment and ecological system. However, at the same time they are of the opinion that during such consideration the 'net effect' of hydro power projects to the environment should be taken into account. It has been proven that net effect of hydro projects have always been positive for the surroundings in terms of groundwater recharge, flourishing of flora and fauna, flood mitigation, availability of water for various purposes, etc.

Also, more power from hydro projects means less dependence on fossil fuel based power plants which emit pollutants to the environment. The Committee have highlighted in the preceding para that hydro power have lesser CO₂ emission as compared to other sources of power including solar power. The Committee, therefore, desire that the hydro power projects should not be seen as just any other development projects. The Committee recommend that hydro power projects should be seen in a broader perspective and a considered view may be taken while granting various clearances. The Committee also feel that there is urgent need to integrate and fast track the process of various clearances granted by the Ministry of Environment and Forest.

(Recommendation Sl. No. 3, Para No. 3)

2.4 The Committee find that there are environmental issues related to hydro power projects that often lead to litigation. The Committee are also aware that there are delays in disposal of such cases that

lead to time and cost overrun in hydro power projects. The Committee, therefore, recommend that for the purpose of better co-ordination amongst the various Ministries and harmonization of their incongruous views, there should be a special cell which will also monitor and expedite the matters pending in the Supreme Court and National Green Tribunal (NGT).

(Recommendation Sl. No. 4, Para No. 4)

2.5 The Committee note that during last few years, river basin studies have been got carried out by MoEF for the major river basins in Arunachal Pradesh and Chenab basin in Himachal Pradesh, etc. The Committee with a view to avoid issues related to ecology and environmental-flow issue as faced in some States, recommend that the Hydro Power Projects should be identified and planned on the basis of River Basin Studies instead of developing them in isolation. The Committee are of the belief that this will not only help in preserving ecological system of the river but also maximize the power generation from these power plants. Further, the decision for setting up of large dam based hydro projects or Run of River projects may be made by taking a holistic view of the respective River Basins.

(Recommendation Sl. No. 5, Para No. 5)

Financial Issues

2.6 The Committee note that a typical hydro station is financed based on the debt/equity ratio of 70:30. The 30% equity has to be managed by developers either from own resources or from public/private placement including IPO. The 70% loan can be taken from various sources like Scheduled Commercial Banks, Non-Banking Financial Institutions or issues of Bonds. The foreign loan is generally available from institution like World Bank, Asian Development Bank (ADB) etc. and is generally availed by PSUs/CPSUs as Government of India's guarantee is required for this. The Committee further note that despite the long life of hydro power projects, only short tenure loans are being sanctioned for them. Since, the loan amount has to be repaid in the 10-12 years; it leads to significant increase in tariff during the initial years. Moreover, due to uncertainties involved in development of hydro power projects, not many banks/institutions are keen to finance these projects. The higher interest rate charged on the loan further aggravates the problem of higher tariff of hydro power.

The Committee also note that considering the interest rate of 10% for a typical hydro project with a capital cost (including Interest During Construction IDC) of Rs. 10 crore/MW, the first year tariff and levelised tariff works out to around Rs. 6.60/kWh & Rs. 6.00/kWh respectively. If interest rate reduces by 4% (either through subvention or by other means), the capital cost of the same project would be reduced to Rs. 9.2 crore/MW due to reduction in IDC component. With this, the first year and levelised tariff would come down to about Rs. 5.35/kWh and Rs. 5.15/kWh respectively. Thus, cheaper financing is the major factor in enhancing the viability of hydro projects. The Committee also note that out of 16 stalled hydro power projects, 10 are stalled due to financial constraints. The Committee are of the view that long term loan at cheaper interest rate is the key to hydro power viability. The Ministry have stated that recently, Government financial institutions like Power Finance Corporation (PFC) and Rural Electrification Corporation (REC) have started to provide the financing of loan for tenure more than 20 years. It has been further stated that the Ministry is engaging with Bankers and Financial Institutions to make low cost funding available for Hydro developers. The Committee welcome this step as they have long been pressing for it. The Committee, therefore, desire that the long tenure finances at cheaper rate should be provided to all the hydro power projects. The Government should also make efforts to get grants/assistance/loan at cheaper rates for hydro power projects from international agencies.

(Recommendation Sl. No. 6, Para No. 6)

Hydro Power Purchase Obligation

2.7 The Committee find that hydro power projects are quite difficult to develop having long gestation period with many uncertainties and added disadvantage of higher initial cost. The Committee note that due to higher hydro power tariff, the developers find it difficult to sign Power Purchase Agreements (PPAs). The Committee understand the necessity of having adequate amount of hydro power in the power system and, therefore, they are of the view Hydro Power should also be promoted on the line of Solar Power by making a provision for Hydro Power Purchase Obligation (HPO). The Committee are of the belief that doing so will give much needed impetus to the development of hydro power sector and encourage the States endowed with hydro power potential to harness it.

(Recommendation Sl. No. 7, Para No. 7)

Water Cess

2.8 The Committee note that some of the States have levied water cess for each cubic meter of water which is used by the hydro power plants. However, the Committee find no sound rationale behind this as there is no consumptive use of water by a hydro power plant. Water just passes through the turbines and goes to the river again. The Committee found that imposition of water cess is not fair considering the provision of 12% of free power to the respective States from the hydro power projects. Since, the levying of water cess further burden the already stressed sector, the Committee are of the firm view that there is a need for relook in this matter by the States who have levied it. The Committee also desire that the Ministry would also persuade the States not to levy any water cess on hydro power projects.

(Recommendation Sl. No. 8, Para No. 8)

Central Public Sector Undertakings

2.9 The Committee note that the present total installed capacity of hydro power is 45,400 MW. The share of Private Sector in that is 3,394 MW which is only 7.5%, whereas, they are the leader in thermal power sector with the share of 39%. The Committee, during the examination of the subject, learnt that many private players who have been allocated hydro power projects are finding it difficult to construct/complete the project due to various reasons including lack of expertise and financial constraints. The Committee find that due to present power sector scenario and constraints in funding of projects the sentiments of the Private Sector in hydro power is low. Even the Secretary Power has acknowledged that lenders are not willing to lend long term loan to private people. In regard to taking up projects of private players which are stuck, the Secretary has stated that all the Central Public Sector Undertakings are willing to take up work and are also willing to enter joint venture model with the State Governments. The Committee are aware that the Central PSUs have the required infrastructure, manpower, expertise and also have vast experience in the field of development of hydro projects. Moreover, there is no problem in mobilization of required fund by them. The Committee, therefore, recommend that the States should involve Central PSUs in harnessing hydro power and give preference in allocation of the projects which are yet to be allocated. The Committee also desire that Central PSUs would make all possible efforts to acquire the abandoned/stressed/stuck hydro power projects.

(Recommendation Sl. No. 9, Para No. 9)

Creation of enabling Infrastructure

2.10 The Committee find that hydro power potentials are site specific and mostly lies in far-flung and remote areas. The access to these sites and their development, in the absence of any connecting road and enabling infrastructure, is an issue. In these conditions developers face much difficulty in developing these projects. The developer not only have the responsibility to develop enabling infrastructure like roads, bridges, etc. for the construction of power projects but also have to bear the expenditure that leads to increase in project cost and power tariff. The Committee, therefore feel that there is need to separate the work and cost of creation of enabling infrastructure and development of actual hydro power project. As the enabling infrastructure so created also helps in overall development of the State, the Committee, therefore, recommend that the State Governments with the help of Central Government should take the responsibility to create enabling infrastructure needed for construction of hydro power projects. The scheme 'Pradhan Mantri Gram Sadak Yojana' of the Central Government could be utilized by the State Government in regard to construction of road by prioritizing the areas wherever hydro power projects are proposed. In addition to utilization of schemes like Pradhan Mantri Gram Sadak Yojana, the Central Government should also explore the other available sources like Central Road Fund for the purpose of developing infrastructure in and around the proposed hydro power projects.

(Recommendation Sl. No. 10, Para No. 10)

Local Area Development Fund (LADF)

2.11 The Committee note that there is provision of Local Area Development Fund (LADF) in the States. 2% of the cost of power of the hydro power project goes to this Fund. The Central and the State Government contribute 1% each to it. It is the responsibility of the State Government to ensure that this fund is utilized for the benefits of the people who are affected by the hydro power projects. It is expected from the State to formulate guidelines and set up Committees to ensure proper utilization of this fund. However, the Committee have been apprised that in case of some of the States this money (2% of the cost of power) goes into the State Government's consolidated fund, and there is no guidelines and Committee in place to ensure that the money is utilized for the intended purpose. The Committee, therefore, desire the Ministry to take up this issue with the States at appropriate level to ensure early compliance by these States. The

Committee also expect the respective State Governments to put in place the required machinery and take necessary measures to ensure timely and proper utilization of the fund.

(Recommendation Sl. No. 11, Para No. 11)

Involvement of Peoples Representatives/Members of Parliament

2.12 The Committee note that certain misconceptions seems to have been associated with the development of all hydro projects in general and large hydro projects in particular. These mainly relate to their perceived adverse impact on environment, forests and wildlife, large submergence of private and forest land and consequently large displacement of population and Rehabilitation & Resettlement issues involved etc. which have hindered development of hydro sector in general. The Ministry have enumerated various steps to address the issues related to development of hydro power projects, their impact on environment and provisions for the benefits of the affected people. The Committee, however, feel that there is still a need for spreading awareness regarding benefits of hydro power and to remove misconceptions related to hydro power. The Committee, therefore, recommend that the Government apart from launching campaigns and disseminating relevant information in this regard at various public platforms, should also invariably involve the respective local representatives/Members of Parliament for this purpose. The Committee believe that their involvement will not only be helpful in this endeavor but also in resolution of many other local issues. The people's representatives are familiar with the local people, their apprehensions as well as their real problems; therefore they would be instrumental in finding common ground.

(Recommendation Sl. No. 12, Para No. 12)

Arunachal Pradesh

2.13 The Committee note that the State of Arunachal Pradesh is well endowed with hydro power potential. The State, as per reassessment study carried out in 1987, has hydro power capacity of 50,064 MW. Against this huge potential, the actual utilization is only 515 MW. The Committee during the examination of the subject found that many projects have been allocated and are at various stages of development. However, due to various reasons most of them have been stalled.

While explaining the reasons for tardy development of hydro power in the State, the Secretary, Power has stated that there is hardly any development because a large number of projects were awarded in 2008 and 2009 at a certain premium. These are MoU-based projects. He has further stated that since water is a State subject, the State has to allot a hydro power project for development. The Central Government/PSUs cannot take initiative on their own to develop the hydro power projects unless they are allocated to them by the States. He has also emphasized that there is a need to start doing surveys and investigations of the potential sites. As surveys and investigations involve expenditure, therefore, financial support of the Government of India is needed in this regard. After, the survey and investigation, such sites could be developed by anybody even by the States.

The Committee also note that there are projects in Arunachal Pradesh which have been allocated to developers but due to various reasons they are finding it difficult to develop those projects. The Committee further note that there is a clause in the Memorandum of Understanding under which the State Government has the exclusive right to re-allot such project to any other developer in case of inordinate delays.

The Committee, therefore, recommend that the Central Government may persuade and provide all the possible assistance to the State Government of Arunachal Pradesh enabling them to take various measures necessary to expeditiously develop hydro power projects in the state. The Committee also expect the State Government of Arunachal Pradesh to take initiatives and cooperate with the Central Government in this regard. The Committee also recommend that the projects which have been stuck due to inability of the developers should be reallocated to Public Sector Undertakings which have required expertise of the field.

(Recommendation Sl. No. 13, Para No. 13)

Uttarakhand

2.14 Based on the River Basin Studies carried out, certain environmental flows have been recommended to be released in the downstream stretch of the river during different seasons to maintain the river eco-system and bio-diversity including flora, fauna & aquatic life. The Committee have been informed that broadly the environmental flows are decided to maintain minimum depth as well as minimum

width of river during different seasons for sustenance of the aquatic life besides the existence of flora and fauna. The quantum of Environmental flow (E-Flow) releases recommended in these Basin Study Reports varies from project to project.

The Committee found that the most affected State by the order of Environmental Flow is Uttarakhand. During the discussion on the subject the representative of the State has stated that they are ready to maintain an Environmental Flow of 15%, as per previous order of Ministry of Water Resources which was also based on the opinion of an expert body. It has also been stated that the recent order to enhance the limit of E- Flow from 15% to 20-30% will result in a loss of about Rs. 120 crore per annum with the existing potential; and it does not include the potential which need to be developed. Further, it has also been stated that the enhancement in E-Flow would make the tariff higher approximately by Rs. 1.25, which would make Power Purchase Agreements absolutely unviable. When the Committee sought the views of the Ministry in this regard, it has been stated that they are definitely with Uttarakhand and they have been trying to resolve this issue at the highest level. The Ministries of Power and Environment have been agreeing, however, the Ministry of Water Resources have different view.

In view of the above the Committee feel that the issue of E-Flow should be resolved amicably by the Ministries/agencies concerned so that a consensus in this regard can be arrived at. The Committee are also of the view that the concept of Environmental Flow is a good measure to preserve ecological system and aqua life of the river. However, the Committee at the same time feel that changing the E-Flow criterion retrospectively would cause hardship for the hydro power developers. The Committee, therefore, recommend that the matter of E-Flow should be resolved as early as possible. The Committee also recommend that in case the enhanced limit of E-Flow sustains, the Government should explore the avenue to provide required assistance to the affected projects including measures like providing Viability Gap Funding so that they remain viable even after reducing their capacity.

(Recommendation Sl. No. 14, Para No. 14)

Eastern/NE Regions/Bihar

2.15 The Committee are aware that almost every year most of the States of Eastern and North-Eastern Region have to face the fury of huge floods that not only result in loss of lives and damage to property

but also takes a heavy toll on the exchequer of the Government in the form of flood relief measures. Bihar is one such State. The Committee during their study visit to Bhakra Dam have realized importance and utility of such multi-purpose projects in flood control apart from generation of electricity at an incredibly low cost.

The Committee note that as per the reassessment of study of hydro potential completed by CEA in 1987, no storage site has been identified within Bihar for construction of storage based hydro scheme. The Ministry have, however, stated that Sapta Kosi High Dam Multipurpose Project (3300 MW) and Sun Kosi Storage cum Diversion Scheme has been proposed to be constructed within Nepal at Barakshetra close to Bihar which would have flood management component. It has been further stated that based on the feasibility report for the project prepared by India in 1981, the project would afford irrigation and flood control benefits in Bihar apart from 15,730 MU of power generation. In addition, development of Inland Waterways through Kosi and Ganga rivers is another important component of the project. DPR for the project is presently under preparation by a Joint Project Office, established at Birat Nagar for carrying out detailed investigations/field works and of DPR which is likely to be completed by September, 2019.

The Committee are of the view that this project would serve the needs of both the countries, therefore, it needs to be developed without further loss of time. The Committee also expect that sincere efforts would be made in this regard at the highest level. The Committee, therefore, recommend the Ministry to ensure that the work of DPR is completed within the stipulated timeline so that the project is developed at the earliest. The Committee also desire that the Government should strive to seek the cooperation of neighboring countries like Nepal, Bhutan and other SAARC Countries for harnessing the natural resources with a view to optimally utilize the available hydro potential for the mutual benefits.

(Recommendation Sl. No. 15, Para No. 15)

Himachal Pradesh

2.16 The Committee note that against the harnessable potential of 23,500 MW, Himachal Pradesh have already developed the capacity to the tune of 10,547 MW. Whereas, 1,885 MW capacity is under construction, 9,136 MW capacity is under the stage of clearances/ investigation and rest which is only 1,364 MW is left for allocation. The Committee find the success of Himachal Pradesh in development

of hydro power sector very encouraging and feel that it shall be emulated by other States endowed with hydro power potential. The Committee, during their study visit was apprised by the representatives of the State Government of Himachal Pradesh of the various enabling measures and proactive steps taken by the State Government that have made them successful in this endeavour. Since, the hydro power projects have high initial cost and long gestation period, therefore, they have deferred the 12% free power share from the power project which was to come in the first 12 years. It shall now be recovered in next 28 years at uniform percentage rate. Another very important thing which the State Government of Himachal Pradesh has recently done is that all the power generated by the hydro power projects up to 25 megawatts, will mandatorily be purchased by the Himachal Pradesh State Electricity Board Limited (HPSEBL). Moreover, they have reduced the premium for setting up hydro power project to Rs. 1,00,000 per megawatt and also giving the Government's land only at Rs. 1 with a view to reduce the overall project cost. Apart from these, they are not levying any water cess. The Committee found that due to keen and friendly approach of the State Government of Himachal Pradesh towards development of hydro power, they are having surplus power and earning addition revenue by exporting it. The Committee, therefore, recommend that the Government should encourage other States having hydro power potential to emulate Himachal Model as this will not only help the nation to optimally harness the hydro power potential in the country but also bring prosperity to these States.

(Recommendation Sl. No. 16, Para No. 16)

NEW DELHI;
02 January, 2019
11 Pausha, 1940 (Saka)

DR. KAMBHAMPATI HARI BABU,
Chairperson,
Standing Committee on Energy.

STATUS OF BASIN-WISE CUMULATIVE IMPACT STUDIES

| Sl.No. | Basin | Status/Recommendations |
|--------|-------|---|
| 1 | 2 | 3 |
| 1. | Siang | <ul style="list-style-type: none"> • MoEF has accepted the Final Report on cumulative impact study carried out by M/s R.S. Envirolink Tech. Pvt. Ltd. <i>Vide</i> their letter dated 20.03.2015 with the following recommendations as under: • Dropping of 15 HEPs with aggregate capacity of 473.5 MW (including 7 HEPs above 25 MW with aggregate capacity of 358 MW viz., Jarong (90 MW), Hirit Korong (42 MW), Soying Korong (48 MW), Siri Korong (58 MW), Sipit Upper (45 MW), Gameng (37 MW) and Yemsing (38 MW) in order to conserve the bio-diversity and tributary habitat etc., out of 44 HE projects aggregating to 18293 MW (including 35 HEPs above 25 MW with aggregate capacity of 18160 MW), envisaged in the study. • Reduce FRL of Naying, Tato-II and Siyom Middle to have free flow stretch of about 1 km. • Diversion of Sittin river for using in Hirong HEP not recommended. • No further HEPs (even < 25 MW) should be planned/allotted in the basin. • One unit of Lower Siang HEP to run continuously throughout the year. • Environment release as recommended for the remaining 28 Projects need to be considered. • The configuration of Upper Siang has to be within the total capacity of 9750 MW frozen/approved by MoEF. • Before accord of environment clearance, cumulative impact analysis of HEPs on Main Siang river (Upper Siang I&II, Lower Siang) would be a mandatory requirement. An additional study to assess the impacts of various configurations of these projects is needed. |

| 1 | 2 | 3 |
|----|-----------|--|
| 2. | Subansiri | <ul style="list-style-type: none"> • Nyikong (13), Palsi (24) and Kaying (14) have been reconsidered by MoEF for implementation <i>vide</i> their letter dated 08.07.2016. • MoEF has accepted the Final Report on cumulative impact study carried out by M/s. IRG System South Asia Ltd. <i>Vide</i> their letter dated 27.04.2016 with the following recommendations as under: <ul style="list-style-type: none"> • 19 HE projects aggregating to 10968 MW, envisaged in the study area, have been covered in the basin level assessment incl. Oju-I (700 MW), Oju-II (1000 MW), Niare (800 MW), Naba (1000 MW), Kurung Dam-I & II (330 MW), Milli (75 MW), Sape (38 MW), Chomi (80 MW), Chela (75 MW), Tammu (55 MW), Nyepin (32 MW), Hiya (41 MW), Dengser (552 MW), Subansiri Lower (2000MW), Subansiri Middle (1600 MW), Subansiri Upper (2000 MW), Tago-I (55MW), Nalo (360 MW) and Tamen (175MW). • Two projects namely Oju-I (700 MW) and Oju-II (1000 MW) have been recommended to be merged as Oju HEP (1878 MW). • Dropping of Tammu HEP (55 MW). • One unit of Subansiri Lower HEP (2000 MW) to run continuously to ensure at least 240 cumec release in the downstream for sustenance of aquatic eco system. • Env. Flow for Tamen (175 MW) & Tago-I (55 MW) not computed as data are not available and recommended to be collected during detailed S&I and EIA/EMP stage. <p>Subansiri Additional river Basin study entrusted by MOEF to M/s. IRG System South Asia Ltd. For 21 HEPs including Dikrong Basin.</p> |
| 3. | Bichom | <ul style="list-style-type: none"> • MoEF has accepted the Final Report on cumulative impact study carried out by WAPCOS <i>vide</i> their letter dated 29.04.2015. • The study was carried out by WAPCOS considering 10 HE Projects aggregating to 905 MW namely Utung (100 MW), Nazong (60 MW), Dibbin (120 MW), Dimijin (20 MW), Dikri (15 MW), Dinchang (360 MW), Jameri (50 MW), Dinan (10 MW), Nafra (100 MW) and Gongri (70 MW). |

| 1 | 2 | 3 |
|----|---------------------------------|--|
| | | <ul style="list-style-type: none"> • Following recommendations made in the Report: • Release of certain percentage of minimum flows continuously in the river during different seasons. <ul style="list-style-type: none"> (i) Season-I (May to Sept.)–High Flow Season–30% of average flow (10 daily or monthly). (ii) Season-II (Oct.)–Average transitional Flow Period between the wet and dry period–20% of average flow. (iii) Season-III (Nov.-March)–low or lean or dry flow season–15% of average flow during this period. (iv) Season-IV (April)–Average transitional Flow Period between the dry and wet period–20% of average flow. • Abandoning of Nazong (60 MW), Dimijin (40 MW), Dinan (10 MW) and Dikri (15 MW) H.E Projects with total Installed capacity of 125 MW. • Modification of the location/levels of Dinchang HEP (360 MW). |
| 4. | Lohit | <p>MoEF has accepted the Final Report on cumulative impact study carried out by WAPCOS vide their letter dated 13.10.2016 with the following recommendations as under:</p> <ul style="list-style-type: none"> • A total of 12 HEPs with aggregate capacity of 8217.90 MW have been considered. • 10 HEPs (above 25 MW) with aggregate capacity of 7443 MW and 1 HEP (less than 25 MW) with aggregate capacity of 24.9 MW have been recommended. • Hutong Stage-I HEP (750 MW) has been recommended to be dropped so that it will provide the free stretch of 19.1 km for migration of Mahaseer & Snow trout and also site is not geologically stable. |
| 5. | Kameng (excluding Bichom) | <p>MoEF has accepted the Final Report on cumulative impact study carried out by WAPCOS vide their letter dated 28.07.2017 with the following recommendations as under:</p> <ul style="list-style-type: none"> • A total of 44 HEPs with aggregate capacity of 4898.90 MW comprising 30 HEPs with aggregate capacity of 4672 MW (above 25 MW installed capacity) have been considered. |

| 1 | 2 | 3 |
|----|--------|---|
| | | <ul style="list-style-type: none"> 7 HE projects aggregating 2337 MW capacity have been dropped which includes 5 HE projects aggregating 1942 MW namely Kameng-I (1120 MW), Kameng-II (600 MW), Pakke (110 MW), Seba (80 MW) and Pasar (32 MW) have been dropped due to projects falling within or on the boundary of Pakke Tiger Reserve & 2 HE projects namely Bichom St-I (190 MW) and Bichom-II (205 MW) have been dropped as the proposed project location may not be viable due to other upstream/downstream projects. |
| 6. | Dibang | <ul style="list-style-type: none"> MoEF has accepted the Final Report on cumulative impact study carried out by M/s. R.S. Envirolink Technologies Pvt. Ltd. <i>vide</i> their letter dated 23.09.2016 with the following recommendations as under: <ul style="list-style-type: none"> A total of 18 HEPs with aggregate capacity of 9973 MW have been considered. 15 HEPs (above 25 MW) with aggregate capacity of 9594 MW and 2 HEPs (less than 25 MW) with aggregate capacity of 44 MW have been recommended. Malinye HEP (335 MW) has been recommended to be dropped as it falls within Dibang Wildlife Sanctuary. One of the turbines of Dibang multipurpose (2880 MW) and Sissiri HEPs (100 MW) should run continuously to ensure sustenance of aquatic eco system. |
| 7. | Tawang | <ul style="list-style-type: none"> MoEF has accepted the Final Report on cumulative impact study carried out by NEHU <i>vide</i> their letter dated 03.02.2016 with the following recommendations as under: <ul style="list-style-type: none"> 13 HE projects aggregating to 2755.9 MW have been covered for the Tawang basin study incl. Tawang-I (600 MW), Tawang -II (800 MW), Rho (93 MW), Mago Chu (96 MW), New Melling (60 MW), Nykcharong Chu (96 MW), Tsa Chu-I (24 MW), Tsa Chu-II (90 MW), Tsa Chu-I Lower (50 MW), Nyamjang Chu (780 MW), Thingbu Chu (60 MW), Jaswantgarh St-I (4.5 MW) & Paikangrong (2.4 MW). Tsa Chu-I HEP (43 MW) and Thingbu Chu HEP (60 MW) has not been recommended as these projects have standardized socio-economic impact assessment (SCIA) index of more than 1.0, project elevation more than 3200m asl. |

| 1 | 2 | 3 |
|----|-------------------|---|
| 8. | Chenab Basin (HP) | <ul style="list-style-type: none"> • E-flow of Nyamjang Chu HEP (780 MW) is to be finalized by a four season study to be undertaken by Wildlife Institute of India (WII) or equivalent. • MoEF has accepted the Final Report on cumulative impact study carried out by M/s R.S. Envirolink Tech. Pvt. Ltd. vide their letter dated 08.03.2018 with the following recommendations as under: <ul style="list-style-type: none"> • A total of 56 HEPs with aggregate capacity of 3510.95 MW comprising 20 HEPs (above 25 MW) with aggregate capacity of 3348 MW have been considered. • 6 HEPs (above 25 MW) with aggregate capacity of 509 MW namely Chiroti Saichu (26 MW), Saichu (58 MW), Saichu Sach Khas (117 MW), Tinget (145 MW), Stingiri (98 MW) & Patam (65 MW) have been recommended to be dropped/preclusion. • 10 HEPs (above 25 MW) with aggregate capacity of 1573 MW namely Gyspa (300 MW), Purthi (210 MW), Lujai (45 MW), Bardang (120 MW), Rashil (130 MW), Tandi (104 MW), Teling (94 MW), Chhatru (126 MW), Shangling (44 MW), Seli (400 MW) have been recommended for revision. |

ANNEXURE II

LIST OF HYDRO STATIONS (ABOVE 25 MW CAPACITY)

| Sl.No. | Utility/ Stations | No. of Stations | No. of Units | No. of Units X Capacity (Mw) | River/ Basin | District | Capacity (MW) | Year of commiss- ioning |
|-----------------------------------|----------------------|--------------------|-----------------|---------------------------------------|-----------------|-----------|------------------|-------------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| CONVENTIONAL H.E. STATIONS | | | | | | | | |
| NORTHERN | | | | | | | | |
| BBMB | | | | | | | | |
| HIMACHAL PRADESH | | | | | | | | |
| 1. | BHAKRA LEFT* | 1 | 5 | (2X108+ 3X126) | SUTLEJ | BILASPUR | 594.00 | 1960-1961 |
| 2. | BHAKRA RIGHT | 1 | 5 | (5X157) | SUTLEJ | BILASPUR | 785.00 | 1966-1968 |
| 3. | DEHAR | 1 | 6 | (6X165) | BEAS | MANDI | 990.00 | 1977-1983 |
| 4. | PONG | 1 | 6 | (6X66) | BEAS | KANGRA | 396.00 | 1978-1983 |
| | SUB-TOTAL BBMB (HP) | 4 | 22 | | | | 2765.00 | |
| NHPC | | | | | | | | |
| 5. | BAIRA SIUL | 1 | 3 | (3X60) | RAVI | CHAMBA | 180.00 | 1980-1981 |
| 6. | CHAMERA-I | 1 | 3 | (3X180) | RAVI | DALHOUSIE | 540.00 | 1994 |
| 7. | CHAMERA-II | 1 | 3 | (3X100) | RAVI | CHAMBA | 300.00 | 2003-2004 |
| 8. | CHAMERA-III | 1 | 3 | (3X77) | RAVI | CHAMBA | 231.00 | 2012 |
| 9. | PARBATI-III | 1 | 4 | (4X130) | SAINJ | KULLU | 520.00 | 2014 |
| | SUB-TOTAL HP | 5 | 16 | | | | 1771.00 | |
| SJVNL | | | | | | | | |
| 10. | NATHPA JHAKRI | 1 | 6 | (6X250) | SATLUJ | SHIMLA | 1500.00 | 2003-2004 |
| 11. | RAMPUR | 1 | 6 | (6X68.67) | SATLUJ | SHIMLA | 412.02 | 2014-15 |
| | TOTAL SJVNL | 2 | 12 | | | | 1912.02 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|----------------------|----|----|---------------|--|----------|---------|---------|
| | NTPC LTD. | | | | | | | |
| 12. | KOLDAM | 1 | 4 | (4X200) | SATLUJ | BILASPUR | 800.00 | 2015 |
| | TOTAL NTPC LTD. | 1 | 4 | | | | 800.00 | |
| | TOTAL CENTRAL SECTOR | 12 | 54 | | | | 7248.02 | |
| | HPSEBL | | | | | | | |
| | | | | - | - | | - | - |
| 13. | BASSI | 1 | 4 | (4X16.5) | BEAS | MANDI | 66.00 | 1970-81 |
| 14. | GIRI BATA | 1 | 2 | (2X30) | YAMUNA | SIRMAUR | 60.00 | 1978 |
| 15. | LARJI | 1 | 3 | (3X42) | Beas River & its tributaries Sainj & Tirthan | KULLU | 126.00 | 2006 |
| 16. | SANJAY | 1 | 3 | (3X40) | SATLUJ | KINNAUR | 120.00 | 1989 |
| | TOTAL HPSEBL | 4 | 12 | | | | 372.00 | |
| | HPPCL | | | | | | | |
| 17. | INTEGRATED KASHANG | 1 | 3 | (3X65) | SATLUJ | KINNAUR | 195 | 2016-17 |
| 18. | SAINJ | 1 | 2 | (2X50) | SAINJ | KULLU | 100 | 2017 |
| | TOTAL HPPCL | 2 | 5 | | | | 295.00 | |
| | PSPCL | | | | | | | |
| 19. | SHANAN | 1 | 5 | (1X50)+(4X15) | UHL & Lamba Dug River | MANDI | 110.00 | 1932-82 |
| | TOTAL PSPCL-HP | 1 | 5 | | | | 110.00 | |
| | TOTAL STATE SECTOR | 7 | 22 | | | | 777.00 | |
| | PRIVATE | | | | | | | |
| | MPCL | | | | | | | |
| 20. | MALANA | 1 | 2 | (2X43) | MALANA | KULLU | 86.00 | 2001 |
| | TOTAL MPCL | 1 | 2 | | | | 86.00 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|--------------------------|----|----|---------|------------------|--------------------|---------|-----------|
| | GBHPPL | | | | | | | |
| 21. | BUDHIL | 1 | 2 | (2X35) | RAVI | CHAMBA | 70.00 | 2012 |
| | TOTAL GBHPPL | 1 | 2 | | | | 70.00 | |
| | EPPL | | | | | | | |
| 22. | MALANA-II | 1 | 2 | (2X50) | MALANA | KULLU | 100.00 | 2011-12 |
| | TOTAL EPPL | 1 | 2 | | | | 100.00 | |
| | IA ENERGY | | | | | | | |
| 23. | CHANJU-I | 1 | 3 | (3X12) | RAVI | CHAMBA | 36.00 | 2017 |
| | TOTAL IA ENERGY | 1 | 3 | | | | 36.00 | |
| 24. | ALLAIN DUHANGAN | 1 | 2 | (2X96) | ALLAIN NALLAH | | 192.00 | 2010-11 |
| | TOTAL ADHPL | 1 | 2 | | | | 192.00 | |
| | HBPCL | | | | | | | |
| 25. | BASPA | 1 | 3 | (3X100) | BASPA | KINNAUR | 300.00 | 2003 |
| 26. | KARCHAM WANGTOO | 1 | 4 | (4X250) | SATLAJ | KINNAUR | 1000.00 | 2011-12 |
| | TOTAL HBPCL | 2 | 7 | | | | 1300.00 | |
| | TOTAL PVT | 7 | 18 | | | | 1784.00 | |
| | TOTAL HP | 26 | 94 | | | | 9809.02 | |
| | JAMMU AND KASHMIR | | | | | | | |
| | JKSPDC | | | | | | | |
| 27. | BAGLIHAR | 1 | 3 | (3X150) | CHENAB | RAMBAN | 450.00 | 2008 |
| 28. | BAGLIHAR II | 1 | 3 | (3X150) | CHENAB | RAMBAN | 450.00 | 2015 |
| 29. | LOWER JHELUM | 1 | 3 | (3X35) | JHELUM | BARAMULLAH | 105.00 | 1978-79 |
| 30. | UPPER SINDH-II | 1 | 3 | (3X35) | SINDH | GANDERBAL | 105.00 | 2001-2002 |
| | TOTAL JKSPDC | 4 | 12 | | | | 1110.00 | |
| | NHPC | | | | | | | |
| 31. | DULHASTI | 1 | 3 | (3X130) | CHENAB | KISTWAR | 390.00 | 2007 |
| 32. | SALAL-II | 1 | 6 | (6X115) | CHENAB | REASI & UDAMPUR | 690.00 | 1987-95 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|-------------------|----|----|----------|---------------------------------|------------|---------|-----------|
| 33. | URI-I | 1 | 4 | (4X120) | JHELUM | BARAMULLA | 480.00 | 1996-1997 |
| 34. | URI-II | 1 | 4 | (4X60) | JHELUM | BARAMULLA | 240.00 | 2013-14 |
| 35. | SEWA-II | 1 | 3 | (3X40) | SEWA II | MAHKA | 120.00 | 2010-11 |
| 36. | CHUTAK | 1 | 4 | (4X11) | INDUS | KARGIL | 44.00 | 2012-13 |
| 37. | NIMOO BAZGO | 1 | 3 | (3X15) | INDUS | LEH | 45.00 | 2013 |
| 38. | KISHEN GANGA | 1 | 3 | (3X110) | KISHEN GANGA | | 330.00 | 2018 |
| | SUB-TOTAL NHPC | 8 | 30 | | | | 2339.00 | |
| | TOTAL J&K | 12 | 42 | | | | 3449.00 | |
| | PUNJAB | | | | | | | |
| | PSPCL | | | | | | | |
| 39. | ANANDPUR SAHIB-I | 1 | 2 | (2X33.5) | AHC (CANAL) | RUPNAGAR | 67.00 | 1985 |
| 40. | ANANDPUR SAHIB-II | 1 | 2 | (2X33.5) | AHC (CANAL) | RUPNAGAR | 67.00 | |
| 41. | MUKERIAN-I | 1 | 3 | (3X15) | TAIL WATER OF PONG DAM | HOSHIARPUR | 45.00 | 1983 |
| 42. | MUKERIAN-II | 1 | 3 | (3X15) | TAIL WATER OF PONG DAM | HOSHIARPUR | 45.00 | 1988-89 |
| 43. | MUKERIAN-III | 1 | 3 | (3X19.5) | TAIL WATER OF PONG DAM | HOSHIARPUR | 58.50 | 1989 |
| 44. | MUKERIAN-IV | 1 | 3 | (3X19.5) | TAIL WATER OF PONG DAM | HOSHIARPUR | 58.50 | 1989 |
| 45. | RANJIT SAGAR | 1 | 4 | (4X150) | Reservoir on River Ravi | PATHANKOT | 600.00 | 2000 |
| | TOTAL PSPCL | 7 | 20 | | | | 941.00 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|----------------------------|---|----|------------------------|-----------------------------------|------------------|---------|-----------|
| | BBMB | | | | | | | |
| 46. | GANGUWAL | 1 | 3 | (2X24.2)+ (1X29.25) | SATLUJ | RUPNAGAR | 77.65 | 1955-1962 |
| 47. | KOTLA | 1 | 3 | (2X24.2)+ (1X29.25) | SATLUJ | RUPNAGAR | 77.65 | 1956-1961 |
| | SUB-TOTAL BBMB (PUNJAB) | 2 | 6 | | | | 155.30 | |
| | TOTAL PUNJAB | 9 | 26 | | | | 1096.30 | |
| | RAJASTHAN | | | | | | | |
| | RRVUNL | | | | | | | |
| 48. | JAWAHAR SAGAR | 1 | 3 | (3X33) | CHAMBAL | BUNDI | 99.00 | 1972-1973 |
| 49. | MAHI BAJAJ-I | 1 | 2 | (2X25) | MAHI | BANSWARA | 50.00 | 1986 |
| 50. | MAHI BAJAJ-II | 1 | 2 | (2X45) | MAHI | BANSWARA | 90.00 | 1989 |
| 51. | RP SAGAR | 1 | 4 | (4X43) | CHAMBAL | | 172.00 | 1968 |
| | TOTAL RRVUNL | 4 | 11 | | | | 411.00 | |
| | UTTARAKHAND | | | | | | | |
| | NHPC | | | | | | | |
| 52. | DHAULI GANGA | 1 | 4 | (4X70) | DHAULI GANGA | PITHORAGARH | 280.00 | 2005 |
| 53. | TANAKPUR | 1 | 3 | (3X31.4) | SARDA | CHAMPAVAT | 94.20 | 1992 |
| | SUB-TOTAL NHPC | 2 | 7 | | | | 374.20 | |
| | THDC | | | | | | | |
| 54. | TEHRI ST-I | 1 | 4 | (4X250) | BHAGI RATHI | TEHRI GARHWAL | 1000.00 | 2006-2007 |
| 55. | KOTESHWAR | 1 | 4 | (4X100) | BHAGI RATHI | TEHRI GARHWAL | 400.00 | 2010-12 |
| | TOTAL THDC | 2 | 8 | | | | 1400.00 | |
| | SUB TOTAL CENTRAL | 4 | 15 | | | | 1774.20 | |
| | STATE SECTOR | | | | | | | |
| | UJVNL | | | | | | | |
| 56. | CHIBRO (YAMUNA) | 1 | 4 | (4X60) | Tons River at Ichari Dam | DEHRADUN | 240.00 | 1975-1976 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|-------------------|----|----|-----------|--|------------------|---------|-----------|
| 57. | CHILLA | 1 | 4 | (4X36) | GANGA | HARIDWAR | 144.00 | 1980-1981 |
| 58. | DHAKRANI | 1 | 3 | (3X11.25) | Tons & Yamuna Rivers at Dakpatthar Barrage | DEHRADUN | 33.75 | 1965-1970 |
| 59. | DHALIPUR | 1 | 3 | (3X17) | Tons & Yamuna Rivers at Dakpatthar Barrage | DEHRADUN | 51.00 | 1965-1970 |
| 60. | KHATIMA | 1 | 3 | (3X13.8) | SHARDA | UDHAMSINGH NAGAR | 41.40 | 1955-1956 |
| 61. | KHODRI | 1 | 4 | (4X30) | TONS | DAKPATTHAR | 120.00 | 1984 |
| 62. | KULHAL | 1 | 3 | (3X10) | TONS | DEHRADUN | 30.00 | 1975 |
| 63. | MANERI BHALI-I | 1 | 3 | (3X30) | BHAGI RATHI | UTTARKASHI | 90.00 | 1984 |
| 64. | MANERI BHALI- II | 1 | 4 | (4X76) | BHAGI RATHI | UTTARKASHI | 304.00 | 2008 |
| 65. | RAMGANGA | 1 | 3 | (3X66) | RAM GANGA | PAURI GARHWAL | 198.00 | 1975-1977 |
| | TOTAL UJVNL | 10 | 34 | | | | 1252.15 | |
| | PRIVATE | | | | | | | |
| | AHPC | | | | | | | |
| 66. | SHRINAGAR | 1 | 4 | (4X82.50) | ALAK NANDA | TEHRI & PAURI | 330.00 | 2015 |
| | JPPVL | | | | | | | |
| 67. | VISHNU PRAYAG | 1 | 4 | (4X100) | ALAK NANDA | | 400.00 | 2006 |
| | SUB-TOTAL PRIVATE | 2 | 8 | | | | 730.00 | |
| | TOTAL UTTARAKHAND | 16 | 57 | | | | 3756.35 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|--------------------------|----|-----|----------|------------------------------------|-------------|----------|-----------|
| | UPJVNL | | | | | | | |
| | UTTAR PRADESH | | | | | | | |
| 68. | KHARA | 1 | 3 | (3X24) | YAMUNA LINK CHANNEL | SONBHADRA | 72.00 | 1992 |
| 69. | MATATILLA | 1 | 3 | (3X10.2) | BETWA | LALITPUR | 30.60 | 1965 |
| 70. | OBRA | 1 | 3 | (3X33) | RIHAND | SUNEBHADRA | 99.00 | 1970-1971 |
| 71. | RIHAND | 1 | 6 | (6X50) | Govind Ballabh Pant Sagar | SINGRAULI | 300.00 | 1961-1965 |
| | TOTAL UPJVNL | 4 | 15 | | | | 501.60 | |
| | TOTAL NORTHERN REGION | 71 | 245 | | | | 19023.27 | |
| | WESTERN | | | | | | | |
| | MADHYA PRADESH | | | | | | | |
| | NHDC | | | | | | | |
| 72. | INDIRA SAGAR | 1 | 8 | (8X125) | NARMADA | KHANDWA | 1000.00 | 2004-2005 |
| 73. | OMKARESHWAR | 1 | 8 | (8X65) | NARMADA | KHANDWA | 520.00 | 2007 |
| | SUB-TOTAL NHDC | 2 | 16 | | | | 1520.00 | |
| | TOTAL CENTRAL | 2 | 16 | | | | 1520.00 | |
| | MPPGCL | | | | | | | |
| 74. | BANSAGAR TONS-I | 1 | 3 | (3X105) | TONS | SATNA | 315.00 | 1991-1992 |
| 75. | BANSAGAR-II | 1 | 2 | (2X15) | TONS | REWA | 30.00 | 2002 |
| 76. | BANSAGAR-III | 1 | 3 | (3X20) | SONE | SATNA | 60.00 | 2000-2002 |
| 77. | BARGI | 1 | 2 | (2X45) | NARMADA | JABALPUR | 90.00 | 1988 |
| 78. | GANDHI SAGAR | 1 | 5 | (5X23) | CHAMBAL | MANDSAUR | 115.00 | 1960-1966 |
| 79. | MADHIKHERA | 1 | 3 | (3X20) | KALI SINDH | SHIVPURI | 60.00 | 2006-2007 |
| 80. | RAJGHAT | 1 | 3 | (3X15) | BETWA | ASHOK NAGAR | 45.00 | 1999 |
| | SUB-TOTAL MPPGCL | 7 | 21 | | | | 715.00 | |
| | TOTAL MP | 9 | 37 | | | | 2235 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|------------------------|---|----|-------------------|---|-----------|---------|-----------|
| MAHARASHTRA | | | | | | | | |
| MAHAGENCO | | | | | | | | |
| 81. | BHIRA TAIL RACE | 1 | 2 | (2X40) | KUND- ALJKA | RAIGAD | 80.00 | 1987-1988 |
| 82. | KOYNA DPH | 1 | 2 | (2X18) | KOYNA | SATARA | 36.00 | 1980-1981 |
| 83. | KOYNA-I&II | 1 | 8 | (4X70)+ (4X80) | KOYNA | PATAN | 600.00 | 1962-1967 |
| 84. | KOYNA-III | 1 | 4 | (4X80) | Water let out through ulestward units (St-I,II & IV) | RATNAGIRI | 320.00 | 1975-1978 |
| 85. | KOYNA-IV | 1 | 4 | (4X250) | KOYNA | SATARA | 1000.00 | 1999-2000 |
| 86. | TILLARI | 1 | 1 | (1X60) | TILLARI | KOLHAPUR | 60.00 | 1986 |
| 87. | VAITARNA | 1 | 1 | (1X60) | VAITARNA | NASIK | 60.00 | 1976 |
| | SUB-TOTAL MAHAGENCO | 7 | 22 | | | | 2156.00 | |
| MPPGCL | | | | | | | | |
| 88. | PENCH | 1 | 2 | (2X80) | PENCH | CHINDWARA | 160.00 | 1986-1987 |
| | SUB-TOTAL MPPGCL | 1 | 2 | | | | 160.00 | |
| | TOTAL STATE SECTOR | 8 | 24 | | | | 2316.00 | |
| PRIVATE | | | | | | | | |
| DODSON-LINDBLOM HYDRO POWER PVT. LTD. (DLHP) | | | | | | | | |
| 89. | BHANDARDHARA ST-II | 1 | 1 | (1X34) | PRAVARA | | 34.00 | 1996 |
| | SUB-TOTAL DLHP | 1 | 1 | | | | 34.00 | |
| TATA POWER COMPANY (PVT.) | | | | | | | | |
| 90. | BHIRA | 1 | 6 | (6X25) | NEELA & MULA | RAIGAD | 150.00 | 1927-1949 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|-----------------------------|----|----|--------------------|-----------|--------------------|---------|-----------|
| 91. | BHIVPURI | 1 | 5 | (3X24)+ (2X1.5) | ANDHRA | RAIGAD | 75.00 | 1997-1999 |
| 92. | KHOPOLI | 1 | 3 | (3X24) | INDRAYANI | RAIGAD | 72.00 | 2001-2003 |
| | SUB-TOTAL TPCL | 3 | 14 | | | | 297.00 | |
| | TOTAL PVT (MAHARASHTRA) | 4 | 15 | | | | 331.00 | |
| | TOTAL MAHARASHTRA | 12 | 39 | | | | 2647.00 | |
| | CHHATTISGARH | | | | | | | |
| | CSPGCL | | | | | | | |
| 93. | HASDEOBANGO | 1 | 3 | (3X40) | HASDEO | KORBA | 120.00 | 1994-1995 |
| | TOTAL CSPGCL | 1 | 3 | | | | 120.00 | |
| | GUJARAT | | | | | | | |
| | GSECL | | | | | | | |
| 94. | UKAI | 1 | 4 | (4X75) | TAPI | TAPI | 300.00 | 1974-1976 |
| | SUB-TOTAL GSECL | 1 | 4 | | | | 300.00 | |
| | SSNNL | | | | | | | |
| 95. | S SAROVAR CHPH | 1 | 5 | (5X50) | NARMADA | NARMADA | 250.00 | 2004 |
| | SUB-TOTAL SSNNL | 1 | 5 | | | | 250.00 | |
| | TOTAL GUJARAT | 2 | 9 | | | | 550.00 | |
| | TOTAL WESTERN REGION | 24 | 88 | | | | 5552.00 | |
| | SOUTHERN | | | | | | | |
| | ANDHRA PRADESH | | | | | | | |
| | APGENCO | | | | | | | |
| 96. | LOWER SILERU | 1 | 4 | (4X115) | SILERU | KHAMMAM | 460.00 | 1976-1978 |
| 97. | NAGARJUNA SGR RBC & EXT. | 1 | 3 | (3X30) | KRISHNA | SATRASALA | 90.00 | 1983-90 |
| 98. | SRISAILAM | 1 | 7 | (7X110) | KRISHNA | MAHABUB- NAGAR | 770.00 | 1982-1987 |
| 99. | UPPER SILERU-I&II | 1 | 4 | (4X60) | SILERU | VISHAKA- PATNAM | 240.00 | 1967-1995 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|--|---|----|-----------------------|-----------------|-------------------|---------|--------------------|
| 100. | NJ SAGAR TPD | 1 | 2 | (2X25) | KRISHNA | GUNTUR | 50.00 | 2017 |
| | TOTAL APGENCO | 5 | 20 | | | | 1610.00 | |
| | TELANGANA | | | | | | | |
| | TSGENCO | | | | | | | |
| 101. | PRIYADARSHNIJURALA | 1 | 6 | (6X39) | KRISHNA | MAHABOOB NAGAR | 234.00 | 2008-2011 |
| 102. | POCHAMPAD | 1 | 4 | (4X9) | GODAVARI | NIZAMABAD | 36.00 | 1987-1988, 2010 |
| 103. | NAGARJUNA SGR | 1 | 1 | (1X110) | KRISHNA | | 110.00 | 1978-85 |
| 104. | NAGARJUNA SGR LBC | 1 | 2 | (2X30) | KRISHNA | GUNTUR | 60.00 | 1983 |
| 105. | LOWER JURALA | 1 | 6 | (6X40) | KRISHNA | WANPARTHY | 240.00 | 2015-16 |
| 106. | PULINCHINTHALA | 1 | 4 | (4X30) | KRISHNA | SURAPETA | 120.00 | 2016-18 |
| | TOTAL TSGENCO | 6 | 23 | | | | 800.00 | |
| | KPCL | | | | | | | |
| | KARNATAKA | | | | | | | |
| 107. | ALMATTI | 1 | 6 | (5X55)+ (1X15) | KRISHNA | BIJAPUR | 290.00 | 2004-2005 |
| 108. | GERUSOPPA (SHARAVATHY TAIL RACE) | 1 | 4 | (4X60) | SHARA- VATHY | UTTARA KANNADA | 240.00 | 2001-2002 |
| 109. | GHAT PRABHA | 1 | 2 | (2X16) | GHAT- PRABHA | BELGAUM | 32.00 | 1992 |
| 110. | MAHATMA GANDHI JOG | 1 | 8 | (4X21.6)+ (4X13.2) | SHARA- VATHY | SHIMOGA | 139.20 | 1949-1952 |
| 111. | KADRA | 1 | 3 | (3X50) | KALI | UTTARA KANNADA | 150.00 | 1997-1999 |
| 112. | KALINADI (NAGJHARI) | 1 | 6 | (3X135)+ (3X150) | KALI | UTTARA KANNADA | 855.00 | 1979-1984 |
| 113. | KALINADI SUPA | 1 | 2 | (2X50) | KALI | UTTARA KANNADA | 100.00 | 1985 |
| 114. | KODASALI | 1 | 3 | (3X40) | KALI | UTTARA KANNADA | 120.00 | 1998-1999 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|-----------------------|----|----|--------------|---------------|-----------------|---------|-----------|
| 115. | LINGNAMAKKI | 1 | 2 | (2X27.5) | SHARA-VATHY | SHIMOGA | 55.00 | 1979-1980 |
| 116. | MUNIRABAD | 1 | 3 | (2X9)+(1X10) | TUNGA-BHADRA | KOPPAL | 28.00 | 1962-1965 |
| 117. | SHARAVATHY | 1 | 10 | (10X103.5) | SHARA-VATHY | SHIMOGA | 1035.00 | 1965-1977 |
| 118. | SIVASAMUNDRUM | 1 | 10 | (4X6)+(6X3) | CAUVERY | MANDYA | 42.00 | 1922-1934 |
| 119. | VARAHI | 1 | 4 | (4X115) | VARAHI | UDUPI | 460.00 | 1989-2009 |
| 120. | BHADRA | 1 | 3 | (2x12)+(1x2) | BHADRA | CHICK MAGALUR | 26.00 | 1965 |
| | TOTAL KPCL | 14 | 66 | | | | 3572.20 | |
| | APGENCO | | | | | | | |
| 121. | T B DAM | 1 | 4 | (4X9) | TUNGA-BHADRA | BELLARI | 36.00 | 1957-1964 |
| 122. | HAMPI | 1 | 4 | (4X9) | TUNGA-BHADRA | BELLARI | 36.00 | 1958-1964 |
| | SUB-TOTAL APGENCO | 2 | 8 | | | | 72.00 | |
| | TOTAL KARNATAKA | 16 | 74 | | | | 3644.20 | |
| | KERALA | | | | | | | |
| | KSEB | | | | | | | |
| 123. | IDAMALAYAR | 1 | 2 | (2X37.5) | IDAMA-LAYAR | | 75.00 | 1987 |
| 124. | IDUKKI | 1 | 6 | (6X130) | PERIYAR | IDUKKI | 780.00 | 1976-1986 |
| 125. | KAKKAD | 1 | 2 | (2X25) | PAMBA | PATHANA MTHITTA | 50.00 | 1999 |
| 126. | KUTTIYADI | 1 | 3 | (3X25) | KUTTIYADI | KOZHICODE | 75.00 | 1972 |
| 127. | KUTTIYADI EXTN. | 1 | 1 | (1X50) | KUTTIYADI | KOZHICODE | 50.00 | 2001 |
| 128. | KUTTIYADI ADDN. EXTN. | 1 | 2 | (2X50) | KUTTIYADI | KOZHICODE | 100.00 | 2010 |
| 129. | LOWER PERIYAR | 1 | 3 | (3X60) | PERIYAR | IDUKKI | 180.00 | 1997 |
| 130. | NERIAMANGLAM | 1 | 3 | (3X15) | MUTHIRA-PUZHA | IDUKKI | 45.00 | 1961-63 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|---------------------------------|----|----|-------------------|---------------------|---------------------|---------|-----------|
| 131. | PALLIVASAL | 1 | 6 | (3X5)+ (3X7.5) | MUTHIRA- PUZHA | IDUKKI | 37.50 | 1948-2001 |
| 132. | PANNIAR | 1 | 2 | (2X15) | PANNIAR | IDUKKI | 30.00 | 1963-2001 |
| 133. | PORINGALKUTTU | 1 | 4 | (4X8) | CHALA- KUDY | COIMBATORE | 32.00 | 1957-1960 |
| 134. | SABARIGIRI | 1 | 6 | (6X50) | PAMBA | PATHANA- MTHITTA | 300.00 | 1960-1967 |
| 135. | SENGULAM | 1 | 4 | (4X12) | MUTHI- RAPUZHA | IDUKKI | 48.00 | 1954-2001 |
| 136. | SHOLAYAR | 1 | 3 | (3X18) | SHOLAYAR | COIMBATORE | 54.00 | 1956-1968 |
| | TOTAL KSEB | 14 | 47 | | | | 1856.50 | |
| | TAMIL NADU | | | | | | | |
| | TANGEDCO | | | | | | | |
| 137. | ALIYAR | 1 | 1 | (1X60) | MASONARY- DAM | COIM- BATORE | 60.00 | 1970 |
| 138. | BHAVANI KATTALAI BARRAGE-I | 1 | 2 | (2X15) | CAUVERY | ERODE | 30.00 | 2006 |
| 139. | BHAVANI KATTALAI BARRAGE-II | 1 | 2 | (2X15) | CAUVERY | ERODE | 30.00 | 2013 |
| 140. | BHAVANI KATTALAI BARRAGE-III | 1 | 2 | (2X15) | CAUVERY | ERODE | 30.00 | 2012 |
| 141. | KODAYAR-I | 1 | 1 | (1X60) | KODAYAR | KANYAKUMARI | 60.00 | 1970 |
| 142. | KODAYAR-II | 1 | 1 | (1X40) | KODAYAR | KANYAKUMARI | 40.00 | 1971 |
| 143. | KUNDAH-I | 1 | 3 | (3X20) | AVLANCH- ESTREAM | NILGRIS | 60.00 | 1960-1964 |
| 144. | KUNDAH-II | 1 | 5 | (5X35) | KUNDAH | NILGRIS | 175.00 | 1960-1965 |
| 145. | KUNDAH-III | 1 | 3 | (3X60) | PENGUNB- AHALLAH | COIMBATORE | 180.00 | 1965-1978 |
| 146. | KUNDAH-IV | 1 | 2 | (2X50) | BHAVANI | COIMBATORE | 100.00 | 1966-1978 |
| 147. | KUNDAH-V | 1 | 2 | (2X20) | BHAVANI | NILGRIS | 40.00 | 1964-1988 |
| 148. | LOWER METTUR-I | 1 | 2 | (2X15) | CAUVERY | SALEM | 30.00 | 1988 |
| 149. | LOWER METTUR-II | 1 | 2 | (2X15) | CAUVERY | SALEM | 30.00 | 1988 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|--------------------------|----|-----|-------------------------------|----------------------------------|-----------------|---------|-----------|
| 150. | LOWER METTUR-III | 1 | 2 | (2X15) | CAUVERY | SALEM | 30.00 | 1987-1988 |
| 151. | LOWER METTUR-IV | 1 | 2 | (2X15) | CAUVERY | SALEM | 30.00 | 1988-1999 |
| 152. | METTUR DAM | 1 | 4 | (4X12.5) | CAUVERY | SALEM | 50.00 | 1937-1946 |
| 153. | METTUR TUNNEL | 1 | 4 | (4X50) | CAUVERY | SALEM | 200.00 | 1965-1966 |
| 154. | MOYAR | 1 | 3 | (3X12) | MOYAR | NILGRIS | 36.00 | 1952-1953 |
| 155. | PAPANASAM | 1 | 4 | (4X8) | THAMBRA- PARANI | TIRUNELVELI | 32.00 | 1944-1951 |
| 156. | PARSON'S VALLEY | 1 | 1 | (1X30) | BHAVANI | NILGRIS | 30.00 | 2000 |
| 157. | PERIYAR | 1 | 4 | (3X42)+ (1X35) | PERIYAR | IDUKKI | 161.00 | 1958-1965 |
| 158. | PYKARA | 1 | 6 | (3X7)+ (2X13.6)+ (1X11) | Glenm organ Forebay dam | NILGRIS | 59.20 | 1932-2005 |
| 159. | PYKARA ULTMATE | 1 | 3 | (3X50) | PYKARA | NILGRIS | 150.00 | 2005 |
| 160. | SARKARPATHY | 1 | 1 | (1X30) | PARABI- KULAM | KOZHICODE | 30.00 | 1966 |
| 161. | SHOLAYARI | 1 | 2 | (2X35) | SHOLAYAR | COIMBATORE | 70.00 | 1971 |
| 162. | SURULIYAR | 1 | 1 | (1X35) | ERAVAN- GALAR | TIRUNELVELI | 35.00 | 1978 |
| | TOTAL TANGEDCO | 26 | 65 | | | | 1778.20 | |
| | TOTAL STATE SECTOR | 67 | 229 | | | | 9688.90 | |
| | TOTAL SOUTHERN REGION | 67 | 229 | | | | 9688.90 | |
| | EASTERN | | | | | | | |
| | WEST BENGAL | | | | | | | |
| | DVC | | | | | | | |
| 163. | MAITHON | 1 | 3 | (1X23.2)+ (2X20) | BASAKAR | WEST DHANBAD | 63.20 | 1957-1958 |
| | TOTAL DVC | 1 | 3 | | | | 63.20 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|--------------------|---|----|----------|--|-----------------|---------|--------------------|
| NHPC | | | | | | | | |
| 164. | TEESTA LOW DAM III | 1 | 4 | (4X33) | TEESTA | DARJEELING | 132.00 | 2013-14 |
| 165. | TEESTA LOW DAM IV | 1 | 4 | (4X40) | Teesta Kalikhola confluence | DARJEELING | 160.00 | 2016 |
| | SUB-TOTAL NHPC | 2 | 8 | | | | 292.00 | |
| | SUB-TOTAL CENTRAL | 3 | 11 | | | | 355.20 | |
| WBSEDCL | | | | | | | | |
| 166. | JALDHAKA | 1 | 4 | (4X9) | Dichu, Nichu & Bindu Khola River | KALIMPONG | 36.00 | 1967-1972, 2012 |
| 167. | RAMMAM | 1 | 4 | (4X12.5) | RAMMAM | DARJEELING | 50.00 | 1995-1996 |
| | SUB-TOTAL WBSEDCL | 2 | 8 | | | | 86.00 | |
| | TOTAL WEST BENGAL | 5 | 19 | | | | 441.20 | |
| SIKKIM | | | | | | | | |
| NHPC | | | | | | | | |
| 168. | RANGIT-III | 1 | 3 | (3X20) | RANGIT | GANGTOK | 60.00 | 2000 |
| 169. | TEESTA-V | 1 | 3 | (3X170) | TEESTA | EAST SIKKIM | 510.00 | 2008 |
| | SUB-TOTAL NHPC | 2 | 6 | | | | 570.00 | |
| STATE | | | | | | | | |
| TEESTA URJA LTD. (TUL) | | | | | | | | |
| 170. | TEESTA-III | 1 | 6 | (6X200) | TEESTA | NORTH SIKKIM | 1200.00 | 2017 |
| | SUB-TOTAL TUL | 1 | 6 | | | | 1200.00 | |
| PRIVATE | | | | | | | | |
| GIPL (GATI INFRA PRIVATE LTD.) | | | | | | | | |
| 171. | CHUZACHEN # | 1 | 2 | (2X55) | RONGLI & EAST RANGPO SIKKIM | | 110.00 | 2013 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|--|---|----|----------------------------------|------------------|---------------------------|---------|--------------------|
| | SNEHA KINETIC POWER PROJECTS PVT. LTD. (SKPPPL) | | | | | | | |
| 172. | DIKCHU | 1 | 2 | (2X48) | | EAST & NORTH SIKKIM | 96.00 | 2017 |
| | SHIGA ENERGY PVT. LTD. (SEPL) | | | | | | | |
| 173. | TASHIDING | 1 | 2 | (2X48.50) | RATHA NGCHU | | 97.00 | 2017 |
| | DANS ENERGY PVT. LTD. (DEPL) | | | | | | | |
| 174. | JORETHANG LOOP | 1 | 2 | (2X48) | RANGIT | SOUTH/WEST | 96.00 | 2015 |
| | SUB-TOTAL PRIVATE | 4 | 8 | | | | 399.00 | |
| | TOTAL SIKKIM | 7 | 20 | | | | 2169.00 | |
| | JHARKHAND | | | | | | | |
| | DVC | | | | | | | |
| 175. | PANCHET | 1 | 1 | (1X40) | RAIN & RIVER | DHANBAD | 40.00 | 1990 |
| | SUB-TOTAL DVC | 1 | 1 | | | | 40.00 | |
| | JUUNL | | | | | | | |
| 176. | SUBERNA REKHA-I | 1 | 1 | (1X65) | SUBERNA REKHA | RANCHI | 65.00 | 1977 |
| 177. | SUBERNA REKHA-II | 1 | 1 | (1X65) | SUBERNA REKHA | RANCHI | 65.00 | 1980 |
| | TOTAL JUUNL | 2 | 2 | | | | 130.00 | |
| | TOTAL JHARKHAND | 3 | 3 | | | | 170.00 | |
| | ODISHA | | | | | | | |
| | OHPC | | | | | | | |
| 178. | BALIMELA | 1 | 8 | (6X60)+ (2X75) | SILERU | MALKANGIRI | 510.00 | 1973-1977, 2008 |
| 179. | HIRAKUD (BURLA) | 1 | 7 | (3X37.5)+ (2X49.5)+ (2X32) | MAHANADI | SAMBALPUR | 275.50 | 1956-1990 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|--------------------------|----|----|----------------------|------------------|--------------------|---------|-----------|
| 180. | HIRAKUD (CHIPLIMA) | 1 | 3 | (3X24) | MAHANADI | SAMBALPUR | 72.00 | 1962-1964 |
| 181. | RENGALI | 1 | 5 | (5X50) | BRAHMANI | ANGUL | 250.00 | 1985-1992 |
| 182. | UPPER INDRAVATI | 1 | 4 | (4X150) | INDRAVATI | KALAHANDI | 600.00 | 1999-2001 |
| 183. | UPPER KOLAB | 1 | 4 | (4X80) | KOLAB | KORAPUT | 320.00 | 1988-1993 |
| | TOTAL OHPC | 6 | 31 | | | | 2027.50 | |
| | APGENCO | | | | | | | |
| 184. | MACHKUND | 1 | 6 | (3X17)+ (3X21.25) | MACH- KUND | KORAPUT | 114.75 | 1959 |
| | SUB-TOTAL APGENCO | 1 | 6 | | | | 114.75 | |
| | TOTAL ODISHA | 7 | 37 | | | | 2142.25 | |
| | TOTAL EASTERN REGION | 22 | 79 | | | | 4922.45 | |
| | NORTH EASTERN | | | | | | | |
| | ARUNACHAL PRADESH | | | | | | | |
| | NEEPCO | | | | | | | |
| 185. | RANGANADI | 1 | 3 | (3X135) | RANGA- NADI | LOWER SUBANSIRI | 405 | 2002 |
| 186. | PARE | 1 | 2 | (2X55) | BRAHMA- PUTRA | | 110 | 2018 |
| | SUB-TOTAL Ar. P | 2 | 5 | | | | 515 | |
| | ASSAM | | | | | | | |
| | NEEPCO | | | | | | | |
| 187. | KOPILI | 1 | 4 | (4X50) | KOPILI | DIMAHASAO | 200.00 | 1988 |
| 188. | KHONDONG | 1 | 2 | (2X25) | KOPILI | DIMAHASAO | 50.00 | 1984 |
| | SUB-TOTAL NEEPCO | 2 | 6 | | | | 250.00 | |
| | APGCL | | | | | | | |
| 189. | KARBI LANGPI | 1 | 2 | (2X50) | BORPANI | KARBI ANGLONG | 100.00 | 2007 |
| | SUB-TOTAL APGCL | 1 | 2 | | | | 100.00 | |
| | TOTAL ASSAM | 3 | 8 | | | | 350.00 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|-------------------------|-----|-----|--------|---|-------------------|----------|------|
| | MIZORAM | | | | | | | |
| | NEEPCO | | | | | | | |
| 190. | TUIRIAL | 1 | 2 | (2X30) | TUIRIAL | KOLASIB | 60.00 | 2017 |
| | TOTAL MIZORAM | 1 | 2 | | | | 60.00 | |
| | NAGALAND | | | | | | | |
| | NEEPCO | | | | | | | |
| 191. | DOYANG | 1 | 3 | (3X25) | DOYANG | WOKHA | 75.00 | 2000 |
| | TOTAL NAGALAND | 1 | 3 | | | | 75.00 | |
| | MANIPUR | | | | | | | |
| | NHPC | | | | | | | |
| 192. | LOKTAK | 1 | 3 | (3X35) | LOKTAK LAKE | CHURA CHANDPUR | 105.00 | 1983 |
| | SUB-TOTAL NHPC | 1 | 3 | | | | 105.00 | |
| | MEGHALAYA | | | | | | | |
| | MePGCL | | | | | | | |
| 193. | KYRDEMKULAI | 1 | 2 | (2X30) | Tail water of UMIAM Stage-II & UMTRU river | RI-BHOI | 60.00 | 1979 |
| 194. | UMIAM ST-I | 1 | 4 | (4X9) | UMIAM | RI-BHOI | 36.00 | 1965 |
| 195. | NEW UMTRU | 1 | 2 | (2X20) | UMTRU | RI-BHOI | 40.00 | 2017 |
| 196. | UMIAM ST-IV | 1 | 2 | (2X30) | Tail water of Stage-III PH & own catchment | RI-BHOI | 60.00 | 1992 |
| 197. | MYNTDU ST-I | 1 | 3 | (3X42) | MYNTDU | JAINTIAHILLS | 126.00 | 2012 |
| | TOTAL MePGCL | 5 | 13 | | | | 322.00 | |
| | TOTAL NE REGION | 13 | 34 | | | | 1427.00 | |
| | TOTAL (CONVENTIONAL) | 197 | 675 | | | | 40613.62 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------------------------------|---------------------|---|----|-----------|----------------|-------------------|---------|---------------------|
| PUMPED STORAGE SCHEMES | | | | | | | | |
| GUJARAT | | | | | | | | |
| 1. | KADANA | 1 | 4 | (4X60) | MAHI | MAHISAGAR | 240.00 | 1987-88 |
| 2. | SARDAR SAROVAR-RBPH | 1 | 6 | (6X200) | NARMADA | NARMADA | 1200.00 | 2004-05, 2005-06 |
| TOTAL GUJARAT | | 2 | 10 | | | | 1440.00 | |
| MAHARASHTRA | | | | | | | | |
| 3. | GHATGHAR | 1 | 2 | (2X125) | PRAVAR | THANE | 250.00 | 2008 |
| 4. | BHIRA PSS | 1 | 1 | (1X150) | | | 150.00 | 1995 |
| SUB-TOTAL MAHARASHTRA | | 2 | 3 | | | | 400.00 | |
| TOTAL WESTERN | | 4 | 13 | | | | 1840.00 | |
| SOUTHERN REGION | | | | | | | | |
| TELANGANA | | | | | | | | |
| 5. | N.J. SAGAR | 1 | 7 | (7X100.8) | KRISHNA | NALGONDA | 705.60 | 1978-85 |
| 6. | SRISAILAM LBPH | 1 | 6 | (6X150) | KRISHNA | NAGARKU- RNOOL | 900.00 | 2000-04 |
| SUB-TOTAL TELANGANA | | 2 | 13 | | | | 1605.60 | |
| TAMIL NADU | | | | | | | | |
| 7. | KADAMPARAI | 1 | 4 | (4X100) | KADAM PARAI | | 400.00 | 1987-88 |
| SUB-TOTAL TAMIL NADU | | 1 | 4 | | | | 400.00 | |
| TOTAL SOUTHERN | | 3 | 17 | | | | 2005.60 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----------------------|----------------------------------|-----|-----|---------|--------------------------|---|----------|------|
| EASTERN REGION | | | | | | | | |
| JHARKHAND | | | | | | | | |
| 8. | PANCHET | 1 | 1 | (1X40) | RAIN & RIVER | | 40.00 | 1990 |
| WEST BENGAL | | | | | | | | |
| 9. | PURULIA | 1 | 4 | (4X225) | SUBARNA PURULIA REKHA | | 900.00 | 2007 |
| | SUB-TOTAL | 1 | 4 | | | | 940.00 | |
| | TOTAL-PSS | 9 | 35 | | | | 4785.60 | |
| | TOTAL (CONVENTIONAL+ PSS)# | 206 | 710 | | | | 45399.22 | |

* Upration of Unit Nos. 2, 4 & 5 Capacity from 108 MW to 126 MW of Bhakra left bank machines. (ref. letter no. CEA-PL-14-38/9/2018-PDM Division)

NOTE:

- The total No. of HE Stations are 204 as N J Sagar HE Station (Southern Region) is having 1 conventional unit and remaining 7 units are PSS. Also, 1 unit of Panchet HE Station (Eastern Region) is conventional and other unit is PSS.
- Following two Hydro Stations have conventional as well as PSS capacity:—

| Sl. No. | Station | State/Region | Installed Capacity (MW) | |
|---------|-----------|--------------------|-------------------------|----------------|
| | | | Conventional | HEPs PSS |
| 1. | N J Sagar | Telangana/Southern | 1X110=110 | 7X100.8=705.60 |
| 2. | Panchet | Jharkhand/Eastern | 1X40=40 | 1X40=40 |

ANNEXURE III

PROJECTS COMMISSIONED DURING 11TH PLAN

| Sl. No. | Name of Project Capacity Agency | Capacity (MW) | Year of Inception (date of first award of main package) | Date of Commis- sioning | Time taken for development in years | Cost of Project (Rs. in crore) |
|---------|---|-------------------|--|-------------------------------|--|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. | Omkareshwar HE Project NHDC Madhya Pradesh | (8x65 MW)=520MW | 2003 | 2007 | 4 | 2224.73 |
| 2. | Teesta-V H.E. Project NHPC Sikkim | (3x170MW)=510MW | 2001 | 2008 | 7 | 2526.22 |
| 3. | Maneri Bhali-II H.E. Project JVNL | (4x76MW) =304MW | 2002 | 2008 | 6 | 1714.41 |
| 4. | Balimela Extn. H.E. Project OHPC | (2x75MW) =150MW | 2003 | 2008 | 5 | 212.40 |
| 5. | Purulia PSS HE Project WBSEB West Bengal | (4x225MW)=900MW | 2001 | 2008 | 7 | 2952.60 |
| 6. | Ghatghar PSS HE Project ID/Govt. of Maharashtra | (2x125MW)=250MW | 2002 | 2008 | 6 | 1564.01 |
| 7. | Baglihar-I H.E. Project JKPDC | (3x150MW)=450MW | 1999 | 2008 | 9 | 5200.00 |
| 8. | Varahi Extn. H.E. Project KPCL 28.10.2003 | (2x115 MW) =230MW | 2005 | 2009 | 4 | 291.00 |
| 9. | Sewa-II NHPCJ&K | (3X40MW)=120MW | 2003 | 2010 | 7 | 1063.12 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|--|--------------------|------|------|----|---------|
| 10. | Kuttiyadi Add. Extn. KSEB | (2x50MW) =100MW | 2003 | 2010 | 7 | 168.28 |
| 11. | Priyadarshni Jurala H.E. Project APGENCO 78 MW Commissioned | (6x39MW) =234MW | 2003 | 2010 | 7 | 547.00 |
| 12. | Allain Duhangan H.P. M/s. AD Hydro Power Ltd. | (2x96MW) =192MW | 2005 | 2010 | 5 | 922.35 |
| 13. | Koteshwar THDC Uttarakhand 200 MW Commissioned | (4x100 MW) =400MW | 2002 | 2012 | 10 | 2398.39 |
| 14. | Myntdu MeSEB 42 MW Commissioned | (2x42MW) =84MW | 2004 | 2011 | 7 | 1173.13 |
| 15. | Karcham Wangtoo H.P. M/s. Jaypee Karcham Hydro Corp. Ltd., (JKHCL) | (4x250 MW) =1000MW | 2003 | 2011 | 8 | 5909.59 |
| 16. | Malana-II H.P. M/s. Everest Power Pvt. Ltd. | (2x50MW) =100MW | 2005 | 2011 | 6 | 747.90 |

PROJECTS COMMISSIONED DURING 12TH PLAN

Hydro Electric Projects Commissioned in 12th Plan (2012-17)

| Sl. No. | Name of Project/ Executing Agency/ Location | Capacity | Year of Inception (date of first award of main package) | Date of Commis- sioning | Time taken for development | Cost of Projects (Rs. in crore) |
|-----------|---|-----------|--|-------------------------------|----------------------------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| A. | From 12th Plan Programme | | | | | |
| | Central Sector | | | | | |
| 1. | Chamera-III NHPC, H.P. | 3x77= 231 | 2005 | 2012 | 7 | 2084 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|--|------------------|------|------|----|-------|
| 2. | Chutak NHPC, J&K | 4x11=44 | 2006 | 2013 | 7 | 913 |
| 3. | Teesta Low Dam-III NHPC, W.B. | 4x33= 132 | 2003 | 2013 | 10 | 1628 |
| 4. | Uri-II NHPC, J&K | 4x60= 240 | 2005 | 2014 | 9 | 2305 |
| 5. | Nimoo Bazgo NHPC, J&K | 3x15= 45 | 2006 | 2013 | 7 | 936 |
| 6. | Parabati-III NHPC, H.P. | 4x130=520 | 2005 | 2014 | 9 | 2716 |
| 7. | Rampur SJVNL, H.P. | 6x68.67=412 | 2007 | 2014 | 7 | 3288 |
| 8. | Kol dam NTPC, H.P. | 4x200=800 | 2002 | 2015 | 13 | 7220 |
| 9. | Teesta Low Dam-IV NHPC, West Bengal | 4x40=160 | 2006 | 2016 | 10 | 1929 |
| | Sub-Total- (Central) | 2584 | | | | |
| | State Sector | | | | | |
| 10. | Bhawani Barrage-III, TANGEDCO, T.N. | 2x15=30 | 2006 | 2013 | 7 | 497 |
| 11. | Bhawani Barrage-III, TANGEDCO, T.N. | 2x15=30 | 2006 | 2013 | 7 | 493 |
| 12. | Myntdu Unit-3, MeECL, Megh. | 1x42=42 | 2004 | 2013 | 9 | 1173 |
| 13. | Baglihar St-II JKPCDC, J&K | 3x150=450 | 2012 | 2015 | 3 | 3113 |
| 14. | Lower Jurala TSGENCO, Telangana | 6x40=240 | 2008 | 2016 | 8 | 1969 |
| 15. | Pulichintala TSGENCO, Telangana | 4x30=120 (30 MW) | 2007 | 2017 | 10 | 563 |
| 16. | Nagarjuna Sagar Tail Pond APGENCO, A.P. | 2x25=50 | 2005 | 2017 | 12 | 959 |
| 17. | Kashang-I HPPCL, H.P. | 1x65=65 | 2009 | 2016 | 7 | 478 |
| 18. | Kashang-II & III HPPCL, H.P. | 1x65+1x65=130 | 2010 | 2017 | 7 | 1080 |
| 19. | Teesta-III Teesta Urja Ltd., Sikkim | 6x200=1200 | 2007 | 2017 | 10 | 13965 |
| 20. | Jaldhaka, WBSEDCL, West Bengal | 4x9=36 (9 MW) | | | | |
| | Sub-Total- (State) | 2276 | | | | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------------|---------------------------------------|-----------------|------|------|----|------|
| Private Sector | | | | | | |
| 21. | Budhil LANCO, HP. | 2x35=70 | 2005 | 2015 | 10 | 418 |
| 22. | Chujachen gati, Sikkim | 2x49.5=99 | 2006 | 2013 | 7 | 1044 |
| 23. | Shrinagar AHPC, Uttarakhand | 4x82.5=330 | 2007 | 2015 | 8 | 2069 |
| 24. | Jorethang Loop Dans Energy, Sikkim | 2x48=96 | 2009 | 2015 | 6 | 543 |
| 25. | Chanju-I, I. A. Energy, H.P. | 3x12=36 (24 MW) | 2011 | 2017 | 6 | 295 |
| Sub-Total- (Private) | | 619 | | | | |
| Total: (From 12th Plan) | | 5479 | | | | |

Hydro Capacity addition during 2017-18

| Sl. No. | Particular | Capacity (MW) | Year of Inception (year of award of civil works) | Date of Commissioning | Time taken for development in years | Cost of Project (Rs. in crore) |
|---------|---|---------------------|--|-----------------------|-------------------------------------|--------------------------------|
| 1. | Tuirial NEEPCO, Mizoram | 2x30=60 MW | 2002 | 2017 | 15 | 1381.71 |
| 2. | Kishanganga NHPC, J&K | 3x110=330 MW | 2009 | 2018 | 9 | 5882.01 |
| 3. | Sainj HPPCL, H.P. | 2x50=100 MW | 2010 | 2017 | 7 | 784.56 |
| 4. | Pulichintala TSGENCO, Telangana | 4x30=120 MW (60 MW) | 2007 | 2017 | 10 | 563.49 |
| 5. | New Umtru MePGCL, Meghalaya | 2x20=40MW | 2007 | 2017 | 10 | 599 |
| 6. | Chanju-I, I.A. Energy, H.P. | 3x12=36 MW | 2011 | 2017 | 6 | 295.09 |
| 7. | Dikchu Sneha Kinetic Power Projects Pvt. Ltd., Sikkim | 2x48=96 MW | 2011 | 2017 | 6 | 1140 |
| 8. | Tashiding Shiga Energy Pvt. Ltd., Sikkim | 2x48.5=97 MW | 2011 | 2017 | 6 | 465.96 |

Hydro Capacity addition for 2018-19

| Sl. No. | Particular | Capacity (MW) | Year of inception | Date of Commissioning | Time taken for development in years | Cost of Project (Rs. in crore) |
|---------|---------------------------------|---------------------|-------------------|-----------------------|-------------------------------------|--------------------------------|
| 1. | Pare NEEPCO, Arunachal Pradesh | 2x55=110 MW | 2009 | 2018 | 9 | 1633.22 |
| 2. | Pulichintala TSGENCO, Telangana | 4x30=120 MW (30 MW) | 2007 | 2018 | 11 | 563.49 |

ANNEXURE IV

RATE OF SALE OF POWER OF HYDRO POWER STATIONS FOR THE
YEAR 2016-2017

| Sl. No. | Name of Utility/ Power Station | Utility | State where the unit is located | Installed Capacity (MW) | Net Gen. (Mkwh) | Rate of Sale of Power as approved by CERC/ SERC (Gen. Tariff) (Paise/Kwh) iii=(i+ii) |
|------------------------|-----------------------------------|-----------|------------------------------------|-------------------------------|-----------------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Northern Region | | | | | | |
| Central Sector | | | | | | |
| 1. | Baira Siul HPS | NHPC Ltd. | Himachal Pradesh | 180.00 | 669.00 | 198.00 |
| 2. | Chamera-I HPS | NHPC Ltd. | Himachal Pradesh | 540.00 | 2224.00 | 216.00 |
| 3. | Chamera-II HPS | NHPC Ltd. | Himachal Pradesh | 300.00 | 1444.00 | 196.00 |
| 4. | Chamera-III HPS | NHPC Ltd. | Himachal Pradesh | 231.00 | 917.00 | 426.00 |
| 5. | Parbati-III HPS | NHPC Ltd. | Himachal Pradesh | 520.00 | 682.00 | 548.00 |
| 6. | Dhaul Ganga HPS | NHPC Ltd. | Uttarakhand | 280.00 | 956.00 | 300.00 |
| 7. | Chutak | NHPC Ltd. | Jammu & Kashmir | 44.00 | 220.00 | 798.00 |
| 8. | Dulhasti HPS | NHPC Ltd. | Jammu & Kashmir | 390.00 | 2280.00 | 564.00 |
| 9. | Salal HPS | NHPC Ltd. | Jammu & Kashmir | 690.00 | 3423.00 | 110.00 |
| 10. | Tanakpur HPS | NHPC Ltd. | Uttarakhand | 94.20 | 430.00 | 296.00 |
| 11. | Uri HPS-I | NHPC Ltd. | Jammu & Kashmir | 480.00 | 2803.00 | 160.00 |
| 12. | Uri HPS-II | NHPC Ltd. | Jammu & Kashmir | 240.00 | 1473.00 | 486.00 |
| 13. | Nimmo-Bazgo | NHPC Ltd. | Jammu & Kashmir | 45.00 | 246.00 | 882.00 |
| 14. | Sewa-II | NHPC Ltd. | Jammu & Kashmir | 120.00 | 471.00 | 434.00 |
| 15. | Koldam | NTPC Ltd. | Himachal Pradesh | 800.00 | 3632.60 | 436.00 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---------------------|--------------------------------------|--------|------------------|---------|---------|--------|
| 16. | NJHPS | SJNL | Himachal Pradesh | 1500.00 | 6994.96 | 238.20 |
| 17. | Rampur HPS | SJNL | Himachal Pradesh | 412.02 | 1959.82 | 322.60 |
| 18. | Tehri HPP | THDC | Uttarakhand | 1000.00 | 2725.43 | 518.00 |
| 19. | Koteshwar HEP | THDC | Uttarakhand | 400.00 | 1062.44 | 534.00 |
| State Sector | | | | | | |
| 20. | WYC Hydel Station | HPGCL | Haryana | 62.40 | 203.65 | 249.00 |
| 21. | Giri Power House | HPSEB | Himachal Pradesh | 60.00 | 139.58 | 76.00 |
| 22. | Andhra Power House | HPSEB | Himachal Pradesh | 16.95 | 54.67 | 119.00 |
| 23. | Bhaba Power House/ Sanjay P House | HPSEB | Himachal Pradesh | 120.00 | 185.28 | 67.00 |
| 24. | Ghanvi Power House | HPSEB | Himachal Pradesh | 22.50 | 74.62 | 225.00 |
| 25. | Bassi Power House | HPSEB | Himachal Pradesh | 66.00 | 296.49 | 75.00 |
| 26. | Binwa Power House | HPSEB | Himachal Pradesh | 6.00 | 27.49 | 193.00 |
| 27. | Gaj Power House | HPSEB | Himachal Pradesh | 10.50 | 29.14 | 267.00 |
| 28. | Baner Power House | HPSEB | Himachal Pradesh | 12.00 | 28.64 | 162.00 |
| 29. | Holi Power House | HPSEB | Himachal Pradesh | 3.00 | 6.16 | 225.00 |
| 30. | Thirot Power House | HPSEB | Himachal Pradesh | 4.50 | 11.26 | 225.00 |
| 31. | Khauli Power House | HPSEB | Himachal Pradesh | 12.00 | 30.64 | 225.00 |
| 32. | Larji Power House | HPSEB | Himachal Pradesh | 126.00 | 536.77 | 237.00 |
| 33. | Nogli Power House | HPSEB | Himachal Pradesh | 2.50 | 7.50 | 310.00 |
| 34. | Chaba Power House | HPSEB | Himachal Pradesh | 1.75 | 4.65 | 233.00 |
| 35. | Rukti Power House | HPSEB | Himachal Pradesh | 1.50 | 1.01 | 134.00 |
| 36. | Sal-II Power House | HPSEB | Himachal Pradesh | 2.00 | 0.00 | 225.00 |
| 37. | Killar | HPSEB | Himachal Pradesh | 0.30 | 0.50 | 225.00 |
| 38. | Bhaba Augumen PH | HPSEB | Himachal Pradesh | 4.50 | 12.76 | 225.00 |
| 39. | Bs Chamba | HPSEB | Himachal Pradesh | 0.45 | 0.99 | 195.00 |
| 40. | Gumma | HPSEB | Himachal Pradesh | 3.00 | 4.23 | 225.00 |
| 41. | Lower Jhelum | J&KPDD | Jammu & Kashmir | 105.00 | 602.14 | 51.00 |
| 42. | Upper Sindh-I Sumbal Kangan | J&KPDD | Jammu & Kashmir | 22.60 | 105.14 | 63.00 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|---------------------------|------------------|-----------------|--------|--------|--------|
| 43. | Upper Sindh-II Kangan | J&KPDD | Jammu & Kashmir | 105.00 | 442.02 | 85.00 |
| 44. | Gandharbal | J&KPDD | Jammu & Kashmir | 15.00 | 89.25 | 47.00 |
| 45. | Karnah Mph | J&KPDD | Jammu & Kashmir | 2.00 | 11.22 | 310.00 |
| 46. | Chenani I | J&KPDD | Jammu & Kashmir | 23.30 | 108.92 | 66.00 |
| 47. | Chenani II | J&KPDD | Jammu & Kashmir | 2.00 | 11.88 | 93.00 |
| 48. | Chenani III Udampur | J&KPDD | Jammu & Kashmir | 7.50 | 36.34 | 142.00 |
| 49. | Iqbal MHP Kargil | J&KPDD | Jammu & Kashmir | 3.75 | 21.08 | 185.00 |
| 50. | IGO Merchellong | J&KPDD | Jammu & Kashmir | 3.00 | 15.72 | 297.00 |
| 51. | Pahalgam MHP | J&KPDD | Jammu & Kashmir | 4.50 | 17.13 | 329.00 |
| 52. | Marpachoo | J&KPDD | Jammu & Kashmir | 0.75 | 3.75 | 298.00 |
| 53. | Haftal | J&KPDD | Jammu & Kashmir | 1.00 | 4.83 | 287.00 |
| 54. | Sanjak | J&KPDD | Jammu & Kashmir | 1.26 | 4.41 | 360.00 |
| 55. | Sewa-III | J&KPDD | Jammu & Kashmir | 9.00 | 32.73 | 202.00 |
| 56. | Bhaderwah | J&KPDD | Jammu & Kashmir | 1.50 | 9.35 | 89.00 |
| 57. | Bazgo | J&KPDD | Jammu & Kashmir | 0.30 | 1.08 | 333.00 |
| 58. | Sumoor | J&KPDD | Jammu & Kashmir | 0.10 | 0.45 | 354.00 |
| 59. | Hunder | J&KPDD | Jammu & Kashmir | 0.40 | 1.76 | 262.00 |
| 60. | Stakna | J&KPDD | Jammu & Kashmir | 4.00 | 19.33 | 41.00 |
| 61. | Mahi Hydel Power Station | RRVJNL | Rajasthan | 140.00 | 208.55 | 341.92 |
| 62. | Mini Micro Hydel (MMH) PS | RRVJNL | Rajasthan | 23.85 | 8.51 | 378.00 |
| 63. | Khara HEP | UPJVNL | Uttar Pradesh | 72.00 | 266.54 | 72.00 |
| 64. | Matatilla HEP | UPJVNL | Uttar Pradesh | 30.60 | 122.19 | 65.00 |
| 65. | Obra HEP | UPJVNL | Uttar Pradesh | 99.00 | 215.17 | 63.00 |
| 66. | Rihand | UPJVNL | Uttar Pradesh | 300.00 | 573.69 | 55.00 |
| 67. | Chibro (Yamuna) HPS | Uttarakhand JVNL | Uttarakhand | 240.00 | 708.45 | 82.90 |
| 68. | Chilla HPS | Uttarakhand JVNL | Uttarakhand | 144.00 | 753.66 | 83.90 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|------------------------|------------------------|------------------|---------|---------|--------|
| 69. | Dhakrani HPS | Uttarakhand JVNL | Uttarakhand | 33.75 | 95.95 | 120.80 |
| 70. | Dhalipur HPS | Uttarakhand JVNL | Uttarakhand | 51.00 | 187.01 | 105.20 |
| 71. | Khatima HPS | Uttarakhand JVNL | Uttarakhand | 41.40 | 173.59 | 123.30 |
| 72. | Khodri HPS | Uttarakhand JVNL | Uttarakhand | 120.00 | 330.01 | 94.20 |
| 73. | Kulhal HPS | Uttarakhand JVNL | Uttarakhand | 30.00 | 119.53 | 83.20 |
| 74. | Tiloth HPS | Uttarakhand JVNL | Uttarakhand | 90.00 | 339.83 | 124.60 |
| 75. | Maneri Bhali-II HPS | Uttarakhand JVNL | Uttarakhand | 304.00 | 1245.10 | 161.10 |
| 76. | Ramganga HPS | Uttarakhand JVNL | Uttarakhand | 198.00 | 178.97 | 105.50 |
| 77. | M'PUR | Uttarakhand JVNL | Uttarakhand | 9.30 | 51.21 | 192.00 |
| 78. | Pathri | Uttarakhand JVNL | Uttarakhand | 20.40 | 116.36 | 142.00 |
| 79. | Galogi | Uttarakhand JVNL | Uttarakhand | 3.00 | 6.48 | 125.00 |
| | Private Sector | | | | | |
| 80. | Shrinagar HEP | Alaknanda HPCL | Uttarakhand | 330.00 | 1274.14 | 488.00 |
| 81. | Malana HEP | Malana PCL | Himachal Pradesh | 86.00 | 263.54 | 297.92 |
| 82. | Malana Stage-II HPS | Everest PPL | Himachal Pradesh | 100.00 | 303.69 | 325.80 |
| 83. | Allain Duhangan HEP | AD Hydro Power Ltd. | Himachal Pradesh | 192.00 | 563.47 | 360.79 |
| 84. | Kashang HEP | HPPCL | Himachal Pradesh | 195.00 | 50.34 | 292.00 |
| 85. | Baspa-II HEP | HBPCL | Himachal Pradesh | 300.00 | 1327.69 | 136.00 |
| 86. | Karcham Wangtoo HEP | HBPCL | Himachal Pradesh | 1000.00 | 4343.86 | 366.00 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|---------------------------|-----------|----------------|---------|---------|--------|
| Western Region | | | | | | |
| Central Sector | | | | | | |
| 87. | Indira Sagar HPS | NHDC Ltd. | Madhya Pradesh | 1000.00 | 3253.33 | 238.92 |
| 88. | Omkareshwar HPS | NHDC Ltd. | Madhya Pradesh | 520.00 | 1416.63 | 340.01 |
| State Sector | | | | | | |
| 89. | Shpgangrel | CSPGCL | Chhattisgarh | 10.00 | 23.50 | 367.90 |
| 90. | Bango HEP | CSPGCL | Chhattisgarh | 120.00 | 146.62 | 89.00 |
| 91. | Mhp Korba West | CSPGCL | Chhattisgarh | 1.70 | 8.59 | 381.90 |
| 92. | Sikasar HEP | CSPGCL | Chhattisgarh | 7.00 | 4.18 | 268.70 |
| 93. | Kadana HPS | GSECL | Gujarat | 242.00 | 344.33 | 168.00 |
| 94. | Ukai HPS | GSECL | Gujarat | 305.00 | 405.85 | 61.00 |
| 95. | Tons Hydro Power Station | MPPGCL | Madhya Pradesh | 315.00 | 1230.00 | 115.00 |
| 96. | Bansagar-II | MPPGCL | Madhya Pradesh | 30.00 | 89.00 | 109.00 |
| 97. | Bansagar-III | MPPGCL | Madhya Pradesh | 60.00 | 72.00 | 275.00 |
| 98. | Jhinna HPS | MPPGCL | Madhya Pradesh | 20.00 | 97.00 | 185.00 |
| 99. | Rani Avanti Bai-bargi HPS | MPPGCL | Madhya Pradesh | 90.00 | 443.00 | 34.00 |
| 100. | Gandhi Sagar HPS | MPPGCL | Madhya Pradesh | 115.00 | 173.00 | 46.00 |
| 101. | Sanjay Gandhi HPS | MPPGCL | Madhya Pradesh | 20.00 | 41.00 | 169.00 |
| 102. | Madhikhera HPS | MPPGCL | Madhya Pradesh | 60.00 | 146.00 | 270.00 |
| 103. | Pench HPS | MPPGCL | Madhya Pradesh | 160.00 | 237.00 | 81.00 |
| 104. | Rajghat HPS | MPPGCL | Madhya Pradesh | 45.00 | 30.00 | 169.00 |
| 105. | Koyana | MSPGCL | Maharashtra | 1956.00 | 3281.55 | 131.00 |
| 106. | Small Hydro Power Plants | MSPGCL | Maharashtra | 454.00 | 930.62 | 305.00 |
| 107. | Bhira | MSPGCL | Maharashtra | 80.00 | 100.46 | 84.00 |
| 108. | Tillari | MSPGCL | Maharashtra | 89.00 | 105.84 | 31.00 |
| 109. | SSP-river Bed Power House | SSNPHP | Gujarat | 1200.00 | 2332.98 | 205.00 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|--|--------------------------|----------------|--------|--------|--------|
| 110. | SSP-Canal Head Power House | SSNPHP | Gujarat | 250.00 | 876.33 | 205.00 |
| | Private Sector | | | | | |
| 111. | Bhira | Tata Power Com. Ltd. | Maharashtra | 300.00 | 929.00 | 141.00 |
| 112. | Bhivpuri | Tata Power Com. Ltd. | Maharashtra | 75.00 | 237.00 | 343.00 |
| 113. | Khopoli | Tata Power Com. Ltd. | Maharashtra | 72.00 | 276.00 | 483.00 |
| 114. | Bhandardra Hep-II | Dodson Lindblom Hydro | Maharashtra | 34.00 | 24.75 | 549.00 |
| | Southern Region | | | | | |
| | State Sector | | | | | |
| 115. | Srisaillam (SRBHES) | APGENCO | Andhra Pradesh | 770.00 | 621.09 | 465.00 |
| 116. | Upper Sileru | APGENCO | Andhra Pradesh | 240.00 | 330.00 | 465.00 |
| 117. | Lower Sileru | APGENCO | Andhra Pradesh | 460.00 | 810.66 | 465.00 |
| 118. | Donkarai | APGENCO | Andhra Pradesh | 25.00 | 60.07 | 465.00 |
| 119. | Penna Ahobilam (Pabrhes) | APGENCO | Andhra Pradesh | 20.00 | 12.62 | 465.00 |
| 120. | Chettipeta | APGENCO | Andhra Pradesh | 1.00 | 2.14 | 465.00 |
| 121. | Muchkund | APGENCO | Odisha | 120.00 | 375.71 | 465.00 |
| 122. | Nagarjunasagar RCPH | APGENCO | Andhra Pradesh | 90.00 | 6.06 | 465.00 |
| 123. | Tungabhadra HES & HAMPI (AP SHARE) | APGENCO | Karnataka | 72.00 | 61.00 | 465.00 |
| 124. | Srisaillam Lebt Bank HES (SLBHES) ¥ | TSPGENCO | Telangana | 900.00 | 610.04 | 766.00 |
| 125. | Nagarjunasagar | TSPGENCO | Telangana | 815.60 | 179.60 | 753.00 |
| 126. | Priyadarshini Jurala | TSPGENCO | Telangana | 234.00 | 208.73 | 583.00 |
| 127. | Pochampad-I | TSPGENCO | Telangana | 27.00 | 54.55 | 298.00 |
| 128. | Pochampad-II | TSPGENCO | Telangana | 9.00 | 19.32 | 407.00 |
| 129. | Nizamsagar | TSPGENCO | Telangana | 10.00 | 11.26 | 534.00 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|---------------------------|------|-----------|---------|---------|--------|
| 130. | Bhadra PH | KPCL | Karnataka | 39.20 | 23.69 | 459.00 |
| 131. | Gerusuppa PH | KPCL | Karnataka | 240.00 | 269.90 | 220.00 |
| 132. | Ghat Prabha HEP | KPCL | Karnataka | 32.00 | 47.77 | 253.00 |
| 133. | Kadra HPS | KPCL | Karnataka | 150.00 | 168.89 | 268.00 |
| 134. | Nagjhari | KPCL | Karnataka | 900.00 | 1551.59 | 98.00 |
| 135. | Kodasalli DPH | KPCL | Karnataka | 120.00 | 148.54 | 192.00 |
| 136. | Munira+MGH+SPH+SPH | KPCL | Karnataka | 226.40 | 482.11 | 79.00 |
| 137. | Sharavathy HPS | KPCL | Karnataka | 1085.50 | 2762.15 | 54.00 |
| 138. | Almatti DPH | KPCL | Karnataka | 290.00 | 396.11 | 246.00 |
| 139. | Varahi UGPH | KPCL | Karnataka | 460.00 | 713.68 | 156.00 |
| 140. | Idamalayar HPS | KSEB | Kerala | 75.00 | 171.96 | 153.00 |
| 141. | Idukki HPS | KSEB | Kerala | 780.00 | 1379.05 | 153.00 |
| 142. | Kakkad HPS | KSEB | Kerala | 50.00 | 130.63 | 153.00 |
| 143. | Kallada HPS | KSEB | Kerala | 15.00 | 44.36 | 153.00 |
| 144. | Kuttiadi + KES+ KAES | KSEB | Kerala | 225.00 | 465.44 | 153.00 |
| 145. | Kuttiadi Tail Race | KSEB | Kerala | 3.75 | 6.35 | 153.00 |
| 146. | Lower Periyar HPS | KSEB | Kerala | 180.00 | 308.22 | 153.00 |
| 147. | Malankara HPS | KSEB | Kerala | 10.50 | 24.74 | 153.00 |
| 148. | Mattupetty | KSEB | Kerala | 2.00 | 2.30 | 153.00 |
| 149. | Malampuzha | KSEB | Kerala | 2.50 | 0.63 | 153.00 |
| 150. | Chembukadavu ST I & II | KSEB | Kerala | 6.45 | 8.64 | 153.00 |
| 151. | Urumi ST I & II | KSEB | Kerala | 6.15 | 9.03 | 153.00 |
| 152. | Lower Meenmutty | KSEB | Kerala | 3.50 | 2.48 | 153.00 |
| 153. | Neriamanglam & NES | KSEB | Kerala | 77.65 | 196.25 | 153.00 |
| 154. | Pallivasal HPS | KSEB | Kerala | 37.50 | 166.01 | 153.00 |
| 155. | Panniar HPS | KSEB | Kerala | 32.40 | 62.17 | 153.00 |
| 156. | Poringalkuthu | KSEB | Kerala | 36.00 | 100.52 | 153.00 |
| 157. | Poringalkuthu LBE | KSEB | Kerala | 16.00 | 94.38 | 153.00 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|------------------------------|------------------------------|------------|--------|--------|--------|
| 158. | Peppara | KSEB | Kerala | 3.00 | 3.95 | 153.00 |
| 159. | Poozhithode | KSEB | Kerala | 4.80 | 10.45 | 153.00 |
| 160. | Peechi | KSEB | Kerala | 1.25 | 0.40 | 153.00 |
| 161. | Rani-perunadu | KSEB | Kerala | 4.00 | 5.85 | 153.00 |
| 162. | Sabarigiri HPS. | KSEB | Kerala | 340.00 | 797.83 | 153.00 |
| 163. | Sengulam HPS. | KSEB | Kerala | 51.20 | 115.58 | 153.00 |
| 164. | Sholayar HPS. | KSEB | Kerala | 54.00 | 167.11 | 153.00 |
| 165. | Vilangad | KSEB | Kerala | 7.50 | 15.78 | 153.00 |
| 166. | Barapole | KSEB | Kerala | 15.00 | 19.32 | 153.00 |
| 167. | Vellathooval | KSEB | Kerala | 3.60 | 3.05 | 153.00 |
| 168. | Chimony | KSEB | Kerala | 2.50 | 1.56 | 153.00 |
| 169. | Adyanpara | KSEB | Kerala | 3.50 | 5.01 | 153.00 |
| 170. | Pykara | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 59.20 | 12.50 | 622.80 |
| 171. | Pykara Mini Micro | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 2.00 | 3.30 | 622.80 |
| 172. | Moyar | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 36.00 | 48.97 | 622.80 |
| 173. | Maravakandy | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 0.75 | 0.32 | 622.80 |
| 174. | Kundah-I | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 60.00 | 156.81 | 622.80 |
| 175. | Kundah-II | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 175.00 | 406.08 | 622.80 |
| 176. | Kundah-III | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 180.00 | 213.42 | 622.80 |
| 177. | Kundah-IV | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 100.00 | 47.17 | 622.80 |
| 178. | Kundah-V | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 40.00 | 43.22 | 622.80 |
| 179. | Kundah-VI (Parson Valley) | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 30.00 | 23.99 | 622.80 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|---------------|---------------------------|------------|--------|-------|--------|
| 180. | Mettur Dam | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 50.00 | 44.16 | 622.80 |
| 181. | Mettur Tunnel | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 200.00 | 80.35 | 622.80 |
| 182. | Barriage-I | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 30.00 | 21.87 | 622.80 |
| 183. | Barriage-II | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 30.00 | 23.59 | 622.80 |
| 184. | Barriage-III | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 30.00 | 25.11 | 622.80 |
| 185. | Barriage-IV | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 30.00 | 19.49 | 622.80 |
| 186. | Bhavani Sagar | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 8.00 | 18.19 | 622.80 |
| 187. | Poonachi | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 2.00 | 1.72 | 622.80 |
| 188. | Sathanoor | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 7.50 | 2.41 | 622.80 |
| 189. | Mukurthy | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 0.70 | 0.26 | 622.80 |
| 190. | Thirumoorthy | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 1.95 | 1.36 | 622.80 |
| 191. | Periyar | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 168.00 | 93.09 | 622.80 |
| 192. | Vaigai | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 19.00 | 3.53 | 622.80 |
| 193. | Suruliyar | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 35.00 | 41.92 | 622.80 |
| 194. | Papanasam | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 32.00 | 65.71 | 622.80 |
| 195. | Servalar | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 20.00 | 11.86 | 622.80 |
| 196. | Sarkarpathy | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 30.00 | 63.19 | 622.80 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|---|---------------------------|-------------|--------|---------|--------|
| 197. | Aliyar | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 60.00 | 61.22 | 622.80 |
| 198. | Kadamparai | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 400.00 | 286.74 | 622.80 |
| 199. | Sholayar-I | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 70.00 | 183.81 | 622.80 |
| 200. | Sholayar-II | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 25.00 | 42.58 | 622.80 |
| 201. | Kodayar-I | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 60.00 | 126.80 | 622.80 |
| 202. | Kodayar-II | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 40.00 | 42.01 | 622.80 |
| 203. | Aliyar Mini | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 2.50 | 0.00 | 622.80 |
| 204. | Pykara Ultimate | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 150.00 | 191.75 | 622.80 |
| 205. | Amaravathy | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 4.00 | 0.78 | 622.80 |
| 206. | Bhavani RBC | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 8.00 | 5.04 | 622.80 |
| 207. | Bhavani Kattalai (BKB) (I, II & III, BB I & II) | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 110.00 | 58.47 | 622.80 |
| 208. | Perunchani | TN Gen. & Dis. Corp. Ltd. | Tamil Nadu | 1.30 | 0.00 | 622.80 |
| Eastern Region | | | | | | |
| Central Sector | | | | | | |
| 209. | Maithon Hydel STA. | DVC | West Bengal | 63.20 | 122.00 | 179.84 |
| 210. | Panchet HPS. | DVC | Jharkhand | 80.00 | 133.60 | 179.84 |
| 211. | Tillaya HPS. | DVC | Jharkhand | 4.00 | 14.10 | 179.84 |
| 212. | Rangit HPS | NHPC Ltd. | Sikkim | 60.00 | 347.00 | 354.00 |
| 213. | Teesta V HPS | NHPC Ltd. | Sikkim | 510.00 | 2773.00 | 232.00 |
| 214. | TLDP-III | NHPC Ltd. | West Bengal | 132.00 | 554.00 | 620.00 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|-----------------------------------|-----------------------------------|-----------------|--------|---------|--------|
| 215. | TLDP-IV | NHPC Ltd. | West Bengal | 160.00 | 603.00 | 256.00 |
| | State Sector | | | | | |
| 216. | Balimela HPS. | Odisha HPCL | Odisha | 510.00 | 983.31 | 106.02 |
| 217. | Hirakud HEP | Odisha HPCL | Odisha | 275.50 | 505.93 | 94.82 |
| 218. | Chiplima HEP | Odisha HPCL | Odisha | 72.00 | 196.89 | 26.05 |
| 219. | Rengali HPS. | Odisha HPCL | Odisha | 250.00 | 531.92 | 60.33 |
| 220. | Upper Indravati HPS. | Odisha HPCL | Odisha | 600.00 | 1472.08 | 146.37 |
| 221. | Upper Kolab HPS. | Odisha HPCL | Odisha | 320.00 | 603.53 | 45.19 |
| 222. | JPH | Govt. of Sikkim, E&P deptt. | Sikkim | 2.10 | 0.38 | 611.00 |
| 223. | Meyong CHU | Govt. of Sikkim, E&P deptt. | Sikkim | 4.00 | 10.86 | 611.00 |
| 224. | Jaldhaka HEP | West Bengal SEDCL | West Bengal | 44.00 | 203.44 | 689.00 |
| 225. | Ramam HEP | West Bengal SEDCL | West Bengal | 51.00 | 245.59 | 689.00 |
| 226. | Teesta Canal Falls | West Bengal SEDCL | West Bengal | 67.50 | 46.23 | 689.00 |
| 227. | Purulia Pumped Storage Project | West Bengal SEDCL | West Bengal | 900.00 | 1088.16 | 689.00 |
| 228. | Mini Micro | West Bengal SEDCL | West Bengal | 14.05 | 27.68 | 689.00 |
| | Private Sector | | | | | |
| 229. | Chuzachen HEP | Gati Infra. Pvt. Ltd. | Sikkim | 110.00 | 494.74 | 202.30 |
| | North Eastern Region | | | | | |
| | Central Sector | | | | | |
| 230. | Loktak HPS. | NHPC Ltd. | Manipur | 105.00 | 741.00 | 366.00 |
| 231. | Doyang H.E.P. | NEEPCO | Nagaland | 75.00 | 255.98 | 498.01 |
| 232. | Kopili H.E.P. | NEEPCO | Assam/Meghalaya | 200.00 | 981.86 | 114.91 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---------------------|--------------------------------------|----------------------------------|-------------------|--------|----------|--------|
| 233. | Khandong H.E.P. | NEEPCO | Assam/Meghalaya | 50.00 | 195.82 | 202.37 |
| 234. | Kopili St.-II H.E.P. | NEEPCO | Assam/Meghalaya | 25.00 | 103.10 | 179.68 |
| 235. | Ranganadi H.E.P. | NEEPCO | Arunachal Pradesh | 405.00 | 1240.93 | 229.45 |
| State Sector | | | | | | |
| 236. | Hydro Power (122 Stns.), Itanagar | Govt. of Arunachal Pradesh | Arunachal Pradesh | 69.71 | 62172.70 | 246.00 |
| 237. | Karbi Langpi HPS. | Assam Power GENCO | Assam | 100.00 | 395.14 | 173.37 |
| 238. | Myntriang Shep St. II | Assam Power GENCO | Assam | 3.00 | 5.67 | 357.76 |
| 239. | Likimro HEP | Govt. of Nagaland | Nagaland | 24.00 | 91.30 | 492.00 |
| 240. | Lang HEP | Govt. of Nagaland | Nagaland | 1.00 | 0.12 | 492.00 |
| 241. | Duilumroi HEP | Govt. of Nagaland | Nagaland | 0.54 | 0.22 | 492.00 |
| 242. | Tehok Hep | Govt. of Nagaland | Nagaland | 1.50 | 0.00 | 492.00 |
| 243. | Umiam St. II | Meghalaya Ene. Cor. Ltd. | Meghalaya | 20.00 | 49.90 | 160.00 |
| 244. | Umiam St. III | Meghalaya Ene. Cor. Ltd. | Meghalaya | 60.00 | 64.76 | 370.00 |
| 245. | Umiam St. IV | Meghalaya Ene. Cor. Ltd. | Meghalaya | 60.00 | 164.94 | 146.00 |
| 246. | Umiam St. I | Meghalaya Ene. Cor. Ltd. | Meghalaya | 36.00 | 95.56 | 150.00 |
| 247. | Sonapani | Meghalaya Ene. Cor. Ltd. | Meghalaya | 1.50 | 7.58 | 80.00 |
| 248. | Mlhpep | Meghalaya Ene. Cor. Ltd. | Meghalaya | 126.00 | 440.70 | 448.00 |
| 249. | Khawiva | Mizoram Power Elect. | Mizoram | 1.05 | 1.54 | 414.00 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|-------------|-------------------------|---------|-------|-------|--------|
| 250. | Tuipui | Mizoram Power Elect. | Mizoram | 0.50 | 0.91 | 414.00 |
| 251. | Maicharm-I | Mizoram Power Elect. | Mizoram | 2.00 | 4.11 | 414.00 |
| 252. | Maicharm-II | Mizoram Power Elect. | Mizoram | 3.00 | 3.94 | 414.00 |
| 253. | Kau Tlabung | Mizoram Power Elect. | Mizoram | 3.00 | 7.60 | 414.00 |
| 254. | Serlui-B | Mizoram Power Elect. | Mizoram | 12.00 | 32.64 | 414.00 |
| 255. | Lamsial | Mizoram Power Elect. | Mizoram | 0.50 | 0.44 | 414.00 |
| 256. | Gumti Hps. | Tripura Secl | Tripura | 15.00 | 40.80 | 111.00 |

ANNEXURE V

THE DETAILS OF GENERATION CAPACITY SINCE 1947 INCLUDING
SHARE OF HYDRO POWER

(As on 31.10.2018)

| Year | Installed Capacity (MW) | | Hydro share (%) |
|---------|-------------------------|---------|-----------------|
| | Total | Hydro | |
| 1 | 2 | 3 | 4 |
| 1947 | 1361.76 | 508.13 | 37.31 |
| 1950 | 1712.52 | 559.29 | 32.66 |
| 1951 | 1835.43 | 575.18 | 31.34 |
| 1952 | 2061.76 | 715.18 | 34.69 |
| 1953 | 2305.19 | 731.18 | 31.72 |
| 1954 | 2494.00 | 793.35 | 31.81 |
| 1955 | 2694.82 | 939.48 | 34.86 |
| 1956 | 2886.14 | 1061.44 | 36.78 |
| 1957-58 | 3223.11 | 1213.92 | 37.66 |
| 1958-59 | 3511.59 | 1361.44 | 38.78 |
| 1959-60 | 3873.17 | 1530.15 | 39.51 |
| 1960-61 | 4653.05 | 1916.66 | 41.19 |
| 1961-62 | 5218.82 | 2419.10 | 46.35 |
| 1962-63 | 5801.19 | 2936.35 | 50.62 Maxm |
| 1963-64 | 6576.94 | 3167.02 | 48.16 |
| 1964-65 | 7396.67 | 3388.73 | 45.81 |
| 1965-66 | 9027.02 | 4123.74 | 45.68 |
| 1966-67 | 10092.17 | 4757.22 | 47.14 |
| 1967-68 | 11888.16 | 5486.92 | 46.17 |
| 1968-69 | 12957.27 | 5906.91 | 45.59 |

| 1 | 2 | 3 | 4 |
|---------|----------|----------|-------|
| 1969-70 | 14102.45 | 6134.70 | 43.50 |
| 1970-71 | 14708.95 | 6383.23 | 43.40 |
| 1971-72 | 15254.37 | 6611.61 | 43.34 |
| 1972-73 | 16281.71 | 6785.41 | 41.68 |
| 1973-74 | 16663.56 | 6965.30 | 41.80 |
| 1974-75 | 18316.68 | 7529.24 | 41.11 |
| 1975-76 | 20117.06 | 8463.60 | 42.07 |
| 1976-77 | 21468.50 | 9024.90 | 42.04 |
| 1977-78 | 23668.71 | 10020.22 | 42.34 |
| 1978-79 | 26680.06 | 10833.07 | 40.60 |
| 1979-80 | 28447.83 | 11383.97 | 40.02 |
| 1980-81 | 30213.68 | 11791.22 | 39.02 |
| 1981-82 | 32345.09 | 12172.81 | 37.63 |
| 1982-83 | 35363.27 | 13055.86 | 36.92 |
| 1983-84 | 39338.86 | 13855.56 | 35.23 |
| 1984-85 | 42584.72 | 14460.02 | 33.96 |
| 1985-86 | 46769.03 | 15471.60 | 33.08 |
| 1986-87 | 49265.86 | 16195.64 | 32.87 |
| 1987-88 | 54155.17 | 17265.33 | 31.88 |
| 1988-89 | 59040.38 | 17798.05 | 30.15 |
| 1989-90 | 63636.34 | 18307.63 | 28.77 |
| 1990-91 | 66086.33 | 18753.42 | 28.38 |
| 1991-92 | 69065.39 | 19194.62 | 27.78 |
| 1992-93 | 72319.46 | 19568.76 | 27.05 |
| 1993-94 | 76718.21 | 20365.91 | 26.58 |
| 1994-95 | 81164.41 | 20829.04 | 25.66 |
| 1995-96 | 83287.96 | 20976.00 | 25.18 |
| 1996-97 | 85019.31 | 21644.80 | 25.46 |
| 1997-98 | 88266.86 | 21891.08 | 24.80 |

| 1 | 2 | 3 | 4 |
|--------------------------------|-----------|----------|-------|
| 1998-99 | 92280.94 | 22438.48 | 24.32 |
| 1999-2000 | 96682.17 | 23816.01 | 24.63 |
| 2000-01 | 99806.20 | 25141.78 | 25.19 |
| 2001-02 | 103410.04 | 26261.23 | 25.40 |
| 2002-03 | 106237.14 | 26910.23 | 25.33 |
| 2003-04 | 110188.76 | 29500.23 | 26.77 |
| 2004-05 | 114608.08 | 30935.63 | 26.99 |
| 2005-06 | 118096.31 | 32325.77 | 27.37 |
| 2006-07 | 132329.21 | 34653.77 | 26.19 |
| 2007-08 | 143061.01 | 35908.76 | 25.10 |
| 2008-09* | 147965.41 | 36877.76 | 24.92 |
| 2009-10 | 159398.49 | 36863.40 | 23.13 |
| 2010-11 | 173626.40 | 37567.40 | 21.64 |
| 2011-12 | 199627.03 | 38990.40 | 19.53 |
| 2012-13 | 223343.60 | 39491.40 | 17.68 |
| 2013-14 | 243028.95 | 40531.41 | 16.68 |
| 2014-15 | 267637.35 | 41267.42 | 15.42 |
| 2015-16 | 298059.97 | 42783.42 | 14.35 |
| 2016-17 | 326848.53 | 44478.42 | 13.61 |
| 2017-18 | 344002.39 | 45293.42 | 13.17 |
| 2018-19 (upto Oct. 2018) | 346047.57 | 45399.22 | 13.12 |

*Hydro capacity with station capacity above 25 MW (2008-09 onward).

ANNEXURE VI

STATE-WISE DETAILS OF UNDER CONSTRUCTION HYDRO ELECTRIC
PROJECTS (ABOVE 25 MW)
HAVING TIME OVERRUN

| Sl. No. | Project Name/ (I.C.)/Executing Agency | Sector | Org. Comm. Sched. | Rev. Comm. Sched. | Ant. Comm. Sched. | Time overrun (months) | Reasons for Delay/ Current Issues |
|--------------------------|---|---------|------------------------|-------------------|--|-----------------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Andhra Pradesh | | | | | | | |
| 1. | Polavaram (12x80=960 MW) APGENCO/Irr. Deptt., A.P. | State | 2017-18 (Mar., 18) | | 2021-23 (Mar., 23) | 60 | <ul style="list-style-type: none"> ➤ Slow progress of works |
| Arunachal Pradesh | | | | | | | |
| 2. | Kameng (4x150 = 600 MW) NEEPCO | Central | 2009-10 (Dec., 09) | | 2018-20 (June, 19) | 114 | <ul style="list-style-type: none"> ➤ Change in dam parameters. ➤ Slow progress in dam & HRT due to bad geology, heavy seepage, inadequate machinery. ➤ Flash flood in Oct., 08 and Sept., 2012. ➤ Ingress of water in HRT. ➤ Poor approach roads. ➤ Contractual issues. ➤ Shortage of aggregate. ➤ Clearance for quarry from State Govt. ➤ Slow Progress of works. ➤ Leakage from penstocks & rectification of defects. ➤ Cash flow issues with civil contractor. ➤ Current Issues: Rectification of defects in penstocks. |
| 3. | Subansiri Lower (8x250 = 2000 MW) NHPC | Central | 2009-11 (Sept., 10) | | 2022-23 [subject to re-start of works (4 years)] | 150 | <ul style="list-style-type: none"> ➤ Delay in transfer of forest land. ➤ Disruption of works by locals in Ar. Pradesh side. ➤ Slope failure in Power House in Jan, 2008. ➤ Damage to bridge on Ranganadi river. ➤ Change in design of surge shafts to surge tunnels. ➤ Stoppage of works due to agitation launched by Anti Dam activists in Assam against construction of Project. Work stopped since 16.12.2011. ➤ Issue of D/s impact studies. ➤ Case in NGT. ➤ Current Issues: Project stalled since December, 2011. Matter sub-judice in NGT. |
| 4. | Gongri 2x72= 144 MW Dirang Energy (P) Ltd. | Private | 2016-17 (Oct., 16) | | 2022-23 [subject to re-start of works (3½ years)] | 77 | <ul style="list-style-type: none"> ➤ Works awarded on 22.11.2011. However, consent to establish from State Pollution Control Board was issued on 19-5-14. ➤ Financial constraints with the developer. ➤ State Govt. terminated the agreement with developer for execution of project. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|--|---------|------------------------|---|-----------------------|-----|---|
| | | | | | | | <ul style="list-style-type: none"> ➤ Current Issues: Project stalled since April, 2016 due to funds constraints with developer. |
| | Himachal Pradesh | | | | | | |
| 5. | Parbati-II (4x200 = 800 MW) NHPC | Central | 2009-10 (Sept., 09) | | 2021-22 (Dec., 21) | 147 | <ul style="list-style-type: none"> ➤ Hon'ble High Court of Himachal Pradesh ban on stone crusher operation. ➤ Delay in revised forest clearance. ➤ TBM suffered extensive damage due to heavy ingress of water and slush in TBM face in Nov, 2006. ➤ Slide in Power House area in Apr-04, Jun-06 and Feb-07. ➤ Flash flood in 2004, 2005, 2010 and 2011. ➤ Jiwa Nallah works affected due to cavity treatment. ➤ Contractual issues. ➤ Poor geology in HRT. ➤ Cash flow issues with civil contractor. ➤ Current Issues: Slow progress of excavation by TBM due to geological constraints. |
| 6. | Uhl-III (3x33.33 = 100 MW) BVPCL | State | 2006-07 (Mar., 07) | | 2019-20 (July, 19) | 149 | <ul style="list-style-type: none"> ➤ Delay in transfer of forest land. ➤ Delay in acquisition of private land. ➤ Delay in transfer of quarry sites. ➤ Delay in award of works. ➤ Contract for construction of HRT rescinded twice i.e. during April, 2008 & July, 2010 due to slow progress and non-performance by the contractor. ➤ Poor geology in HRT. (-leakage observed in Penstock during HST of Penstock -Repair of Penstock). |
| 7. | Sawra Kuddu (3x37 =111MW) HPPCL | State | 2011-12 (Jan., 12) | | 2019-20 (May, 19) | 88 | <ul style="list-style-type: none"> ➤ Delay in MOEF clearance. ➤ Delay in award of Civil & E&M works. ➤ Poor geology in HRT. ➤ Slow progress of HRT Lining. ➤ Contractual issues. ➤ Contract for HRT package terminated on 9.1.14. Re-awarded in Nov., 2014 to M/s. HCC. ➤ Current Issues: Completion of HRT. |
| 8. | Shongtom Karcham (3x150 = 450 MW) HPPCL 16.08.2012 | State | 2016-17 (Mar., 17) | | 2024-25 (Apr., 24) | 85 | <ul style="list-style-type: none"> ➤ Shifting of Army Ammunition Depot. ➤ Local Issues. ➤ Current Issues: Slow progress of works. |
| 9. | Bajoli Holi 3x60= 180 MW M/s GMR Bajoli Holi | Private | 2018-19 (May, 18) | | 2019-20 (Aug., 19) | 15 | <ul style="list-style-type: none"> ➤ Slow progress of works. |
| 10. | Tidong-I 2x50 =100 MW Statkraft India Pvt. Ltd. | Private | 2013-14 (Dec., 13) | | 2021-22 (Oct., 21) | 94 | <ul style="list-style-type: none"> ➤ Delay in NOC by Projects affected Panchayats. ➤ Suspension of works by Govt. for one year. ➤ Funds constraints with the developer. ➤ Current Issues: Project stalled since July, 2016 due to funds constraints with developer. M/s Statkraft India Pvt. Ltd. has acquired the 100% equity of the project on 04.09.2018. Mobilisation is under progress. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----------------------------|--|---------|-----------------------|---|--|-----|---|
| 11. | Tangnu Romai-I (2x22 = 44 MW) TRPGPL | Private | 2014-15 (June 14) | | 2021-22 (subject to re-start of works (4 years)) | 93 | <ul style="list-style-type: none"> ➤ Slow progress of civil works. ➤ Poor geology. ➤ Difficult area. ➤ Weather conditions & accessibility. ➤ Financial constraints with the developer. ➤ Current Issues: Project stalled since January, 2015 due to funds constraints with developer. |
| 12. | Sorang (2x50 = 100 MW), HSPPL | Private | 2011-12 (Nov., 11) | | 2020-21 [subject to re-start of works (1 Year)] | 112 | <ul style="list-style-type: none"> ➤ Poor geology. ➤ Poor weather conditions, difficult & poor accessibility. ➤ Penstock cracks/leakage during filling of Water conductor System in Nov., 13. ➤ Rupture in surface penstock in Nov.15 during trial run. ➤ Funds constraints with developer. ➤ Current Issues: Project stalled since November, 2015 due to funds constraints with developer. |
| Jammu & Kashmir | | | | | | | |
| 13. | Pakal Dul (4x250=1000 MW) CVPPL | Central | 2020-21 (Apr., 20) | | 2023-24 | 47 | <ul style="list-style-type: none"> ➤ Current Issues: Award of TBM package of HRT. ➤ Delay in award of work |
| 14. | Parnai 3x12.5= 37.5 MW JKSPDC | State | 2017-18 (Jan., 18) | | 2021-22 (Mar., 22) | 50 | <ul style="list-style-type: none"> ➤ Slow progress of works. ➤ Delay in Land acquisition. ➤ Current Issues: Slow progress of works due to funds constraints with contractor. |
| 15. | Lower Kalnai 2x24= 48 MW JKSPDC | State | 2017-18 (Sep., 17) | | 2022-23 [subject to re-start of works (4 years)] | 66 | <ul style="list-style-type: none"> ➤ Inadequate mobilization of man & machinery by Contractor. ➤ Delay in finalization of R&R Plan. ➤ Slow progress of works. ➤ Funds constraints with contractor. Contractor under CDR. ➤ Current Issues: Project stalled since January, 2018 due to payment dispute with subcontractors and due to non-settlement of extension of time of the contract by the JKSPDC. |
| 16. | Ratle (4x205+1x30)= 850 MW Ratle HEP Pvt.Ltd. | Private | 2017-18 | | 2023-24 [subject to re-start of works (5 years)] | 72 | <ul style="list-style-type: none"> ➤ Slow progress of works. ➤ Current Issues: Project stalled since 11.7.14 due to frequent local disturbance. ➤ Developer wants to surrender the Project to State Govt., Govt. of J&K, PDD have terminated PPA on 09.02.2017 and directed JKSPDC to take over the project. ➤ The parties namely, GVKRHEPPL and JKPDD have contested their respective claims and matter is now Sub-judice. |
| Kerala | | | | | | | |
| 17. | Pallivasal 2x30 = 60 MW KSEB | State | 2010-11 (Mar., 11) | | 2020-21 (Dec., 20) | 117 | <ul style="list-style-type: none"> ➤ Slow progress of civil works. ➤ Delay in land acquisition. ➤ Change in alignment of Adit to HRT. ➤ Poor geology strata in HRT. ➤ Heavy Monsoon. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|--|---------|-----------------------|---|--|-----|--|
| | | | | | | | <ul style="list-style-type: none"> ➤ Works stopped by contractor since 28.1.15 due to contractual issues. Contractor resumed remaining works in April, 2017 except Intake and balance tunneling works of Phase I which is now not included in his scope of contract. Re-tendering of balance Intake works are in process. ➤ Current Issues: Slow progress of works. |
| 18. | Thottiyar (1x30+1x10)=40MW KSEB | State | 2012-13 (Apr., 12) | | 2020-21 | 107 | <ul style="list-style-type: none"> ➤ Land acquisition issue. ➤ The works of weir and approach channel stopped from 2010 to 2012 by local people. ➤ The work stopped by Court from 12.12.2012 to April-2013. ➤ Contractual issues. ➤ Financial crunch with contractor. ➤ Foreclosure of earlier contract in April, 2017 and balance works re-awarded in January, 2018. ➤ Current Issues: Slow progress of works. |
| | Madhya Pradesh | | | | | | |
| 19. | Maheshwar (10x40 = 400 MW) SMHPCL | Private | 2001-02 (Mar., 02) | | 2020-21 (subject to re-start of works (1½ years) | 228 | <ul style="list-style-type: none"> ➤ R&R issues. ➤ Cash flow problem with developer. ➤ PFC as lead lender have acquired majority equity i.e. 51% in the SMHPCL w.e.f. 1st June, 2016. Matter Sub-judice. <p>Current Issues: Project stalled since November, 2011 due to cash flow problem with developer. PFC has filed an application in NCLT Ahmedabad on 16th February 2018 to start Corporate Insolvency Resolution Professional (CIRP) under Insolvency and Bankruptcy Code (IBC). The way forward is now dependent on the outcome of the petition filed by PFC in NCLAT seeking resolution under IBC and also on the forensic audit by CAG.</p> |
| | Maharashtra | | | | | | |
| 20. | Koyna Left Bank PSS 2x40 = 80 MW WRD, Maha | State | 2014-15 (Oct., 14) | | 2022-23 [subject to re-start of works (4 years)] | 101 | <ul style="list-style-type: none"> ➤ Slow progress of works. ➤ Fund constraints due to increase in project cost. RCE under approval. <p>Current Issues: Project stalled since July, 2015 due to current expenditure on the project reached to almost original administrative approved cost level hence expenditure on the project is stopped. Revised cost is under approval by State Govt.</p> |
| | Punjab | | | | | | |
| 21. | Shahpurkandi 3x33+3x33+ 1x8 =206 MW, Irrigation Deptt. & PSPCL | State | 2015-16 | | 2021-22 (Nov., 21) | 68 | <ul style="list-style-type: none"> ➤ Current Issues: Works of Dam stopped since 29.08.2014 due to inter-state dispute between States of J&K and Punjab on sharing of waters of river Ravi and Tariff. An agreement was signed on 8.9.2018 between Chief Secretary, Govt. of Jammu |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|--|---------|-----------------------|-----------------------|--|-----|--|
| | | | | | | | & Kashmir and Chief Secretary, Govt. of Punjab. The Punjab Cabinet ratified the above agreement. Zero date of the project is 1st November, 2018 and the project would be completed in 3 years. |
| | Sikkim | | | | | | |
| 22. | Teesta Stage VI (4x125 = 500 MW) Lanco Energy Pvt. Ltd. | Private | 2012-13 (July, 12) | | 2021-22 [subject to re-start of works (3 years)] | 116 | <ul style="list-style-type: none"> ➤ Poor geology. ➤ Land acquisition. ➤ Contractual issues. ➤ Funds constraints with developer. ➤ Current Issues: Project stalled since April, 2014 due to funds constraints with developer. |
| 23. | Rangit-IV HE Project (3X40 = 120 MW) JPCL | Private | 2011-12 (Jan., 12) | | 2021-22 (subject to re-start of works (3 1/2 year)) | 122 | <ul style="list-style-type: none"> ➤ Slow progress of HRT & Surge Shaft works due to poor geology. ➤ Works hampered due to earthquake in September, 2011. ➤ Financial constraints with developer. ➤ Current Issues: Project stalled since October, 2013 due to funds constraints with developer. |
| 24. | Bhasmey (2x25.5 = 51 MW) Gati Infrastructure | Private | 2012-13 (June, 12) | | 2021-22 [subject to re-start of works (3 years)] | 117 | <ul style="list-style-type: none"> ➤ Forest clearance. ➤ Financial constraints with developer. ➤ Current Issues: Project stalled since September, 2016 due to funds constraints with developer. |
| 25. | Rongnichu (2x48 = 96 MW) Madhya Bharat Pvt. Ltd. | Private | 2014-15 (July, 14) | | 2019-20 (Mar., 20) | 68 | <ul style="list-style-type: none"> ➤ Land Acquisition. ➤ Poor geology. |
| 26. | Rangit-II 2x33 = 66 MW Sikkim Hydro Power Ltd. | Private | 2015-16 (Apr., 15) | | 2020-21 [subject to re-start of works (2 1/2 years)] | 71 | <ul style="list-style-type: none"> ➤ Slow progress of works. ➤ Financial constraints with the developer. ➤ Current Issues: Project stalled since December, 2017 due to funds constraints with developer. |
| 27. | Panan 4x75 = 300 MW Himagiri Hydro Energy Pvt. Ltd. | Private | 2018-19 | | 2022-23 [subject to re-start of works (4 1/2 years)] | 48 | <ul style="list-style-type: none"> ➤ Clearance from NWLB received in December, 2015. ➤ Clearance from NGT obtained. ➤ Applied for NoC from Govt. of Sikkim in NWL Bangle. ➤ Current Issues: Project stalled since April, 2014 due to want of NOC from NWLB. |
| | Tamil Nadu | | | | | | |
| 28. | Kundah PSS (1x125 = 125 MW) TANGEDCO | State | 2022-23 | | 2022-23 | | |
| | Uttarakhand | | | | | | |
| 29. | Tapovan Vishnughad (4x130 = 520 MW) NTPC | Central | 2012-13 (Mar., 13) | 2015-16 (Mar., 16) | 2020-21 (Dec., 20) | 93 | <ul style="list-style-type: none"> ➤ Heavy water ingress due to bad geology in HRT and rock fall on TBM. TBM struck up thrice. ➤ Flash flood in June, 2013 & Aug., 2012 damaging coffer dam. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|---|---------|------------------------|--------------------------------|--|-----|--|
| | | | | | | | <ul style="list-style-type: none"> ➤ Termination of civil contracts for Barrage and HRT. ➤ Cash flow issues with civil contractors. ➤ Current Issues: Excavation of HRT by TBM. |
| 30. | Lata Tapovan (3x57 = 171 MW) NTPC | Central | 2017-18 (Aug., 17) | | 2022-23 [subject to re-start of works (4 years)] | 67 | <ul style="list-style-type: none"> ➤ Flash flood during June, 2013 in Uttarakhand. ➤ Local issues/non-start of works in Barrage area. ➤ Current Issues : Hon'ble Supreme court ban on construction works since May-14. Matter is sub-judice. |
| 31. | Tehri PSS (4x250 = 1000 MW) THDC | Central | 2010-11 (July, 10) | 2015-16 (Feb., 16) RCE-I | 2021-22 (May, 21) (subject to re-start of works) | 130 | <ul style="list-style-type: none"> ➤ Approval of RCE as L-1 price bid was more than cost estimate. RCE approved in Nov. 2011. ➤ Cash flow problem with contractor. ➤ Litigation by bidders. ➤ Poor geology. ➤ Local agitation at Asena Quarry. ➤ Agitation at muck disposal area. ➤ Poor preparedness of contractor. ➤ Revision of Lay out of machine hall due to poor geology. ➤ Current Issues:- Works stalled since April, 2018 due to funds constraints with contractor |
| 32. | Vishnugad Pipalkoti (4x111 = 444 MW) THDC | Central | 2013-14 (June, 13) | | 2021-22 (Dec., 21) | 102 | <ul style="list-style-type: none"> ➤ CCEA approval in Aug.2008 but works could not be awarded due to Forest clearance/diversion of forest land. Forest land was acquired in January-14 and subsequently works awarded in January-2014. ➤ Disruption of works by local people. ➤ Current Issues:- Cash flow problem with contractor. |
| 33. | Vyasi 2x60=120 MW, UJVNL | State | 2014-15 (Dec., 14) | | 2019-20 (Mar., 20) | 63 | <ul style="list-style-type: none"> ➤ Delay in award of works. ➤ Local Issues. |
| 34. | Singoli Bhatwari (3x33 = 99 MW) L&T | Private | 2012-13 (Dec., 12) | | 2018-20 (June, 19) | 78 | <ul style="list-style-type: none"> ➤ Poor geology in HRT. ➤ Agitation by local people. ➤ Flash flood in June, 2013. |
| 35. | Phata Byung (2x38 = 76 MW), LANCO | Private | 2012-13 (June, 12) | | 2021-22 [subject to re-start of works (3 years)] | 117 | <ul style="list-style-type: none"> ➤ Flash flood in June, 2013. ➤ Poor geology in HRT. ➤ Current Issues:- Works stalled since July, 2017 due to funds constraints with contractor |
| 36. | Naitwar Mori (2x30=60 MW) SJVNL West Bengal | Central | 2021-22 (Dec., 21) | | 2021-22 (Dec., 21) | | |
| 37. | Rammam-III (3x40= 120 MW) | Central | 2019-20 (Sept., 19) | | 2021-22 (Feb., 22) | 29 | <ul style="list-style-type: none"> ➤ Delay in getting permission for tree felling from Govt. of West Bengal for Access road from Adit-1 to Adit-2. ➤ Cash flow issues with civil contractors. ➤ Strike/bandh during Gorkhaland agitation. |

ANNEXURE VII

HYDRO ELECTRIC SCHEMES CONCURRED BY CEA AND
YET TO BE TAKEN UP FOR CONSTRUCTION

(As on 30.10.2018)

| Sl.No | Name of Scheme | State | Sector | Developer | Installed Capacity (MW) | CEA Concurrence | Remarks |
|---|--------------------------|-------------------|---------|-----------|-------------------------|------------------------|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| CATEGORY-I: Pending due to Environment and Forest Clearance issues | | | | | | | |
| (a) Environment Clearance received and Forest Clearance is awaited | | | | | | | |
| 1. | Rupsiyabagar Khasiyabara | Uttarakhand | Central | NTPC | 261 | 16.10.08 | EC accorded on 26.03.2009. FC-I & FC-II yet to be obtained. MoEF&CC declined FC due to project location in highly sensitive wild life habitat. |
| 2. | Devsari | Uttarakhand | Central | SJNL | 252 | 07.08.12/upto 06.08.17 | EC recommended by EAC on 27.12.11. Letter Revalidation will be issued after FC-I, FC-I & FC-II yet to be obtained. FC-I pending with State Govt. Additional information sought by MoEF&CC vide letter 13.09.17. |
| 3. | Sawalkot | Himachal Pradesh | State | JKSPC | 1856 | 27.12.16 | EC recommended by EAC on 31.01.17. FC yet to be obtained. |
| 4. | Miyar | Himachal Pradesh | Private | MHPCL | 120 | 07.02.13 | EC accorded on 30.07.12. FC-I accorded on 27.07.12. FC-II yet to be obtained. FRA compliance under process. |
| 5. | Chhatru | Himachal Pradesh | Private | DSC | 126 | 15.1.15 | EC recommended by EAC on 24.02.15, Letter will be issued after FC-I, FC-I & FC-II yet to be obtained. As per MoEF&CC, developer is not responding. |
| 6. | Luhri | Himachal Pradesh | Central | SJNL | 210 | 01.05.2018 | EC recommended by EAC on 27.08.2018. FC stage-I clearance granted by MoEF&CC vide letter dt. 19.09.2018. |
| 7. | Turga PSP | West Bengal | State | WBSPCL | 1000 | 05.10.16 | EC accorded on 02.07.2018. FC-I accorded on 12.04.18 and FC-2 shall be applied. |
| 8. | Teesta St-IV | Sikkim | Central | NHPC | 520 | 13.05.10 | EC accorded on 09.01.14. FC-I accorded on 26.02.13. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC vide letter 08.08.2017. MoU with State Govt. to be amended by developer. |
| 9. | Lower Kopili | Assam | State | APGCL | 120 | 24.05.16 | EC recommended by EAC on 05.12.2017. Letter will be issued after FC-I, FC-I pending with Nodal Officer. |
| 10. | Tawang St-I | Arunachal Pradesh | Central | NHPC | 600 | 10.10.11 | EC accorded on 10.6.11. FC-I & FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC vide letter 13.06.17. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--|--------------|-------------------|---------|-----------|------|-----------|---|
| 11. | Tawang St-II | Arunachal Pradesh | Central | NHPC | 800 | 22.09.11 | EC accorded on 10.06.11. FC-I accorded on 08.01.14. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC vide letter 23.02.2017. Local resident are not cooperating. |
| 12. | Dibang | Arunachal Pradesh | Central | NHPC | 2880 | 18.09.17 | EC accorded on 19.05.15. FC-I accorded on 15.04.15. FC-II yet to be obtained. Land acquisition in process. For FC-II, compliance Report awaited from State Govt. |
| 13. | Dibbin | Arunachal Pradesh | Private | KSKDHPL | 120 | 04.12.09 | EC accorded on 23.7.12. FC-I accorded on 7.2.12. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC vide letter 08.08.2017. |
| 14. | Kalai-II | Arunachal Pradesh | Private | Kalai PPL | 1200 | 27.3.15 | EC accorded 20.05.15. FC-I and FC-II yet to be obtained. |
| 15. | Heo | Arunachal Pradesh | Private | HHPL | 240 | 28.07.15 | EC accorded on 10.11.15. FC-I accorded on 27.10.15. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC was furnished to on 02.11.17. |
| 16. | Tato-I | Arunachal Pradesh | Private | SHPL | 186 | 28.10.15 | EC accorded on 10.11.15. FC-I accorded on 27.10.15. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC vide letter 11.01.17. |
| 17. | Talong Londa | Arunachal Pradesh | Private | GWR | 225 | 16.08.13 | EC accorded on 07.08.15. FC-I & FC-II yet to be obtained. Pending with State Govt. Additional information sought by MoEF&CC vide letter 08.02.17. |
| 18. | Etalin | Arunachal Pradesh | Private | EHEPCL | 3097 | 12.07.13 | EC recommended by EAC on 31.01.17. Letter will be issued after FC-I. FC-I & FC-II yet to be obtained. Additional information sought by MoEF&CC vide letter 28.03.2017. |
| (b) Both Environment and Forest Clearance awaited | | | | | | | |
| 19. | Kirthai-II | J&K | State | JKPDC | 930 | 27.12.16 | EC & FC yet to be obtained by developer. Survey under process. |
| 20. | Kynshi-I | Meghalaya | Private | AKPPL | 270 | 31.3.2015 | EC & FC yet to be obtained by developer. EIA/ EMP report under preparation. Issue of funding for Flood Moderation component to be resolved. |
| 21. | Dikhu | Nagaland | Private | NWPPL | 186 | 31.03.14 | EC yet to be obtained by developer. FC not applicable as forest land is not involved. EC proposal will be submitted in next 6-7 months. Property survey in progress. |
| 22. | Lower Siang | Arunachal Pradesh | Private | JVL | 2700 | 16.02.10 | EC & FC yet to be obtained by developer. Facing difficulties in conducting public hearing due to local protest. However, as per MoEF&CC, matter of FC is closed vide letter dated 19.01.2016. |
| 23. | Hirong | Arunachal Pradesh | Private | JAPL | 500 | 10.04.13 | EC & FC yet to be obtained by developer. EIA/ EMP report being revised as per Siang BSR. FC-I under process at State level. However, as per MoEF&CC, matter of FC is closed vide letter dated 02.12.2015. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|-----------------|-------------------|---------|--------|------|---|---|
| 24. | Naying | Arunachal Pradesh | Private | NDSCPL | 1000 | 11.09.13 | EC & FC yet to be obtained by developer. EC is linked with Siang BSR which is completed and accepted by MoEF&CC. FC-I pending with State Govt. For FC-I, additional information sought by MoEF&CC vide letter 26.05.2015. |
| 25. | Attulni | Arunachal Pradesh | Private | AHEPCL | 680 | 02.07.2018 | Both the EC and FC are yet to be obtained. |
| (c) Environment and Forest Clearance Sub-judice | | | | | | | |
| 26. | Kotlibhel St-IA | Uttarakhand | Central | NHPC | 195 | 03.10.06 | EC accorded on 09.05.07. FC-I accorded on 13.10.11 & for FC-II, Compliance Report is awaited from State Govt. The project is included in the list of 24 projects under review by Hon'ble Supreme Court. Hon'ble Supreme Court vide order dated 13.08.2013 directed the MoEF&CC as well as State of Uttarakhand not to grant any further Environmental Clearance for any hydropower projects in the State of Uttarakhand until further orders. In compliance to the above order, MoEF & CC constituted an Expert Body vide order dated 12.05.2015. Expert Body has given its report to MoEF&CC in Sept., 2017. The expert Body has recommended the project should operate to run one turbine continuously during lean season to minimize peaking impact at Devprayag. |
| 27. | Kotlibhel St-IB | Uttarakhand | Central | NHPC | 320 | 31.10.06 | EC accorded earlier on 14.08.07 is withdrawn on 22.11.10. MoEF&CC declined FC-I on 7.07.11. The project is included in the list of 24 projects under review by Hon'ble Supreme Court. Hon'ble Supreme Court vide order dated 13.08.2013 directed the MoEF&CC as well as State of Uttarakhand not to grant any further Environmental Clearance for any hydropower projects in the State of Uttarakhand until further orders. In compliance to the above order, MoEF&CC constituted an Expert Body vide order dated 12.05.2015. Expert Body has given its report to MoEF&CC in Sept., 2017. The expert Body has recommended the project with a channel of around 700 m. long may be provided. Further EB has recommended that the project should operate to run one turbine continuously during lean season to minimize peaking impact at Devprayag. |
| 28. | Alaknanda | Uttarakhand | Private | GWRL | 300 | 08.08.08/ Revalidation upto 07.08.17 | EC accorded on 12.3.08, FC-I accorded on 8.11.11. FC-II accorded on 09.11.2012. The project is included in the list of 24 projects under review by Hon'ble Supreme Court. |
| 29. | Nyamjang Chhu | Arunachal Pradesh | Private | BEL | 780 | 24.03.11 | EC accorded on 19.4.12. FC-I accorded on 09.04.2012. NGT vide judgement dated 07.04.2016, has suspended EC till the time the studies as directed are to be carried out. WII study is under process and will be completed by March, 2018. |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--|-------------------|-------------------|---------------|--------|------|------------|---|
| 30. | Demwe Lower | Arunachal Pradesh | Private | ADPL | 1750 | 20.11.09 | EC accorded on 12.02.10. FC-II accorded on 03.05.2013. NGT <i>vide</i> judgement dated 24.10.17 directed to review the NBWL clearance by MoEF&CC. Financial closure yet to be obtained. Developer informed that interim Resolution Professional (IRP) has been appointed by The National Company Law Tribunal (NCLT) to resolve financial issues of the firm. |
| CATEGORY-II: Environment and Forest Clearance accorded and pending due to other reasons | | | | | | | |
| 31. | Kiru | J&K | Joint Venture | CVPL | 624 | 13.06.16 | EC accorded on 24.06.2016 & FC accorded on 19.05.2016. Tendering for all the packages issued and packages will be awarded after PIB approval. Note for PIB proposal is under examination in CEA. |
| 32. | New Ganderwal | J&K | State | JKSPC | 93 | 10.6.14 | EC accorded on 27.9.13 & FC accorded on 02.04.2012. Letter of award has been issued to M/s HCC, performance guarantee awaited. PPA signed with State Government. Loan agreement to be signed with finances. |
| 33. | Kwar | Himachal Pradesh | Joint Venture | CVPP | 540 | 23.02.17 | EC accorded on 10.04.17. FC accorded on 08.08.14. Tenders for Civil, HM and E&M packages issued. Works will be awarded after investment approval by Government. Note for PIB proposal is under examination in CEA. |
| 34. | Kutehr | Himachal Pradesh | Private | JSWEPL | 240 | 31.08.10 | EC accorded on 05.07.2011. FC-I accorded on 22.06.2011 & FC-II accorded on 19.02.2013. Validity of earlier bids has expired due to delay in obtaining FC-II and acquisition of Pvt. Land. Award of main works is almost finalized but contract is not signed in absence of PPA. No DISCOM is ready to sign PPA. |
| 35. | Athirappilly | Kerala | State | KSEB | 163 | 31.03.05 | EC restored on 9.10.15. FC accorded. Fresh tenders are under process. |
| 36. | Loktak Downstream | Manipur | Central | LDHCL | 66 | 05.05.17 | EC accorded on 16.01.2013. FC-I accorded on 03.03.2011 & FC-II accorded on 22.12.2014. Due to no response from bidders, retendering of main packages are under process. PIB proposal is with MoP. |
| 37. | Nafra | Arunachal Pradesh | Private | SNEL | 120 | 11.02.11 | EC accorded on 19.08.13. FC-I accorded on 12.7.11 & FC-II accorded on 19.11.2012. PPA yet to be signed. Thereafter Financial agreement to be made to resume works. Developer to submit revised PPS based on BSR to CEA within one month. |
| CATEGORY-III: Projects in which Developer withdrawn from Implementation | | | | | | | |
| 38. | Seli | Himachal Pradesh | Private | SHEPCL | 400 | 27.10.2016 | EC accorded on 3.7.13. FC-I accorded on 01.07.13. FC-II yet to be obtained. Compliance Report is awaited from State Govt. Govt. of HP <i>vide</i> ltr dtd 23.09.17 have cancelled the allotment of Seli HEP in favour of M/s. Seli Hydro Electric Power Company Ltd. and reverted back to GoHP since Developer has failed to sign the |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------|-----------------------|---------------------|---------|----------|-------|----------|---|
| | | | | | | | implementation agreement within stipulated period given in PIA. PIA also stands cancelled. In view of above, Secretary, CEA requested to GoHP vide ltr dtd. 8.05.18 to furnish the status of the project. Secretary, CEA vide letter dated 18.06.18 informed that Seli HEP stands cancelled vide GoHP cancellation order dated 23.09.17. The project has been advertised for fresh allotment by GoHP through ICB route on BOOT basis under Private Sector during March, 2018. |
| 39. | Sach Khas/ Private | Himachal Pradesh | Private | L&T HHPL | 267 | 27.10.16 | EC & FC yet to be obtained by developer. The proposal has been forwarded by MoEF&CC to RO for site inspection. Site inspection is to be carried out. M/s. DHPL vide ltr dtd. 8.3.2018 informed that they have withdrawn from the project. On request of Developer GoHP vide ltr dtd 23.09.2017 cancelled allotment of Dugar HEP & reverted back to Govt. of HP without any liability of Govt. In view of above, Secretary, CEA vide ltr dtd. 23.4.2018 requested GoHP to furnish the status of Dugar HEP (449 MW) DPR. Secretary, CEA vide letter dated 14.06.18 informed that Dugar HEP stands cancelled vide GoHP cancellation order dated 23.09.17. The project has been advertised by GoHP for fresh allotment through ICB route on BOOT basis under Private Sector during March, 2018. |
| 40. | Dugar | Himachal Pradesh | Private | DHPL | 449 | 20.12.16 | EC recommended by EAC in Oct, 2016. Letter will be issued after FC-I. FC-I & FC-II yet to be obtained. FRA compliance under process. Developer vide letter dated 28.08.2018 informed that the company has decided not to go ahead with implementation of the project. In view of the above Secretary, CEA vide letter dated 19.09.2018 requested Government of Arunachal Pradesh to furnish the status of project. |
| 41. | Tagurshit | Arunachal Pradesh | Private | L&T | 74 | 21.10.16 | EC recommended by EAC on 11.07.14. Letter will be issued after FC-I. FC-I & FC-II yet to be obtained. FRA compliance under process. Developer vide letter dated 29.08.2018 informed that the company has decided not to go ahead with implementation of the project. In view of this Secretary, CEA requested to Government of Himachal Pradesh vide letter dated 19.09.2018 to furnish status of the project. |
| Total | | | | | 26780 | | |

ANNEXURE VIII

LIST OF HYDRO-ELECTRIC SCHEMES IN INDIA UNDER
EXAMINATION IN CEA

| Sl. No. | Scheme | State | Sector | Agency | Units x MW | Installed Capacity (MW) | Month of Receipt |
|---------|-------------------------|-------------|---------|--------|--------------|-------------------------|------------------|
| 1. | Jelam Tamak | Uttarakhand | Central | THDCIL | 3x36 | 108 | 12/12 |
| 2. | Bowala Nand Paryag | Uttarakhand | State | UJVNL | 4x75 | 300 | 08/12 |
| 3. | Kirthai-I | J&K | State | JKSPDC | 4x95+1x10 | 390 | 07/17 |
| 4. | Wah-Umiam Stage-III (*) | Meghalaya | Central | NEEPCO | 2x42.5 | 85 | 08/17 |
| 5. | Thana Plaun | HP | State | HPPCL | 3x50.33+2x20 | 191 | 02/18 |
| 6. | Goriganga-III A | Uttarakhand | Central | NHPC | 3x50 | 150 | 04/18 |
| Total | | | | | | 1224 | |

(*) Wah-Umiam Stage-II HE Project was formerly known as Mawphu Stage-II HE Project.

(%) Developer *vide* letter dated 29.08.2018 informed that the company has decided not to go ahead with the implementation of the project.

ANNEXURE IX

| Sl. No. | Scheme/ Sector/ State | Developer | Installed Capacity (MW) | CEA Concurrence | Status/Remarks |
|---|--|-----------|-------------------------|--------------------------------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 |
| CATEGORY-I: Pending due to Environment and Forest Clearance issues | | | | | |
| (c) Environment Clearance received and Forest Clearance yet to be obtained | | | | | |
| 42. | Rupsiyabagar Khasiyabara/ Central/ Uttarakhand | NTPC | 261 | 16.10.08 | EC accorded on 26.03.09. FC-I & FC-II yet to be obtained. MoEF&CC declined FC due to project location in highly sensitive wild life habitat. |
| 43. | Teesta St-IV/ Central/Sikkim | NHPC | 520 | 13.05.10 | EC accorded on 09.01.14. FC-I accorded on 26.02.13. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC. MoU with State Govt. to be amended by developer. State Forest Department submitted compliance report of FC-I to MoEF&CC for issuance of FC-II. NHPC has submitted its replies on the observations raised by MoEF&CC. |
| 44. | Tawang St-I/ Central/Arunachal Pradesh | NHPC | 600 | 10.10.11 | EC accorded on 10.6.11. FC-I & FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC. Land acquisition in process. Local resident are not cooperating. As per MOM chaired by Secretary (Power), pending issues with MoEF&CC to be taken up after FC-II is accorded to Tawang-II HE Project. |
| 45. | Tawang St-II/ Central/Arunachal Pradesh | NHPC | 800 | 22.09.11 | EC accorded on 10.06.11. FC-I accorded on 8.01.14. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC. Local resident are not cooperating. Minister of State (I/C), MOP requested Hon'ble CM, Ar. Pr. to intervene in the matter for submitting compliance report under FRA 2006 by State Govt. to MoEF&CC for accord of FC-II. |
| 46. | Dibang/Central/ Arunachal Pradesh | NHPC | 2880 | 18.09.17 | EC accorded on 19.05.15. FC-I accorded on 15.04.15. FC-II yet to be obtained. Land acquisition in process. For FC-II, compliance Report awaited from State Govt. |
| 47. | Devsari/Central/ Uttarakhand | SJVNL | 252 | 07.08.12/ Revalidation upto 06.08.18 | EC recommended by EAC on 27.03.2018 with additional conditions such as submission of Technical feasibility report of constructing a wall around Debal SHEP |

| 1 | 2 | 3 | 4 | 5 | 6 |
|-----|---|-----------|------|----------|---|
| | | | | | and provision of e-flows as per recommendations of report on CIA and CCS by EB-II. Matter in this regard is being taken up with MoEF&CC by developer. Developer was asked to submit present status on issue of submergence of Debal SHEP subsequent to receipt of grievance from developer of Debal SHEP. FC-I accorded by MoEF&CC on 26.02.18. FC-II yet to be obtained. |
| 48. | Sawalkot/State/ Jammu & Kashmir | JKSPC | 1856 | 18.04.18 | EC recommended by EAC on 31.01.17. FC yet to be obtained. Joint survey under process. |
| 49. | LowerKopili/State/ Assam | APGCL | 120 | 24.05.16 | EC recommended by EAC on 5.12.2017. Letter will be issued after FC-I. FC-I pending with Nodal Officer. As per developer, the proposal of FC-I was to be approved by State Govt. and thereafter it will be sent to MoEF&CC |
| 50. | Turga PSP/State/ West Bengal | WBSPL | 1000 | 05.10.16 | EC accorded on 2.07.2018. FC-I accorded on 12.04.18, FC-II shall be applied. |
| 51. | Miyar/Private/ Himachal Pradesh | MHPCL | 120 | 07.02.13 | EC accorded on 30.07.12. FC-I accorded on 27.07.12. FC-II yet to be obtained. FRA compliance under process. Financial closure under process. |
| 52. | Dibbin/Private/ Arunachal Pradesh | KSKDHPL | 120 | 04.12.09 | EC accorded on 23.7.12. FC-I accorded on 7.2.12. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC. Developer to submit revised PPS based on BSR to CEA. Project being transferred to State Govt./ NEEPCO. |
| 53. | Kalai-II/Private/ Arunachal Pradesh | Kalai PPL | 1200 | 27.3.15 | EC accorded 20.5.15. FC-I and FC-II yet to be obtained. Developer to submit revised PPS based on BSR to CEA. |
| 54. | Heo/Private/ Arunachal Pradesh | HHPPL | 240 | 28.07.15 | EC accorded on 10.11.15. FC-I accorded on 27.10.15. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC which was furnished to MoEF&CC. Infrastructure/Roads to be developed by State Govt./BRO. |
| 55. | Tato-I/Private/ Arunachal Pradesh | SHPPL | 186 | 28.10.15 | EC accorded on 10.11.15. FC-I accorded on 27.10.15. FC-II yet to be obtained. For FC-II, additional information sought by MoEF&CC. Infrastructure/Roads to be developed by State Govt./BRO. |
| 56. | Talong Londa/ Private/Arunachal Pradesh | GMR | 225 | 16.08.13 | EC accorded on 07.08.15. FC-I & FC-II yet to be obtained. Pending with State Govt. Additional information sought by MoEF&CC. |

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|--------|--------------|--|--|
| 57. | Chhatru/Private/ Himachal Pradesh | DSC | 126 | 15.1.15 | EC recommended by EAC on 24.02.15, Letter will be issued after FC-I. FC-I & FC-II yet to be obtained. Land acquisition under process. As per MoEF&CC, developer is not responding. |
| 58. | Etalin/Private/ Arunachal Pradesh | EHEPCL | 3097 | 12.07.13 | EC recommended by EAC on 31.01.17. Letter will be issued after FC-I. FC-I & FC-II yet to be obtained. Additional information sought by MoEF&CC. WII study is to be carried out. |
| 59. | Luhri Stage-I/ Central/Himachal Pradesh | SJVNL | 210 | 01.05.18 | EC recommended by EAC on 27.08.2018. FC-I clearance granted by MoEF&CC vide letter dt. 19.09.2018. |
| | Sub Total | | 13813 | | |
| (d) Both Environment and Forest Clearance yet to be obtained | | | | | |
| 60. | Kirithai-II/State/ Jammu & Kashmir | JKPDC | 930 | 27.12.16 | EC & FC yet to be obtained by developer. Public hearing to be done. Survey under process. |
| 61. | Lower Siang/ Private/Arunachal Pradesh | JAPL | 2700 | 16.02.10 | EC & FC yet to be obtained by developer. Facing difficulties in conducting public hearing due to local protest. However, as per MoEF&CC, matter of FC is closed. |
| 62. | Hirong/Private/ Arunachal Pradesh | JAPL | 500 | 10.04.13 | EC & FC yet to be obtained by developer. EIA/EMP report being revised as per Siang BSR. FC-I under process at State level. However, as per MoEF&CC, matter of FC is closed. Developer to submit revised PPS based on BSR to CEA. |
| 63. | Naying/Private/ Arunachal Pradesh | NDSCPL | 1000 | 11.09.13 Revalidation upto 10.09.19 | EC & FC yet to be obtained by developer. EC is linked with Siang BSR which is completed and accepted by MoEF&CC. FC-I pending with State Govt. For FC-I, additional information sought by MoEF&CC. Developer to submit revised PPS based on BSR to CEA. DISCOMs are reluctant to sign PPA. |
| 64. | Kynshi-I/Private/ Meghalaya | AKPPL | 270 | 31.3.2015 | EC & FC yet to be obtained by developer. EIA/EMP report under preparation. EC proposal will be submitted by Sept, 2018. FC-I proposal will be submitted to State Govt. Issue of funding for Flood Moderation component to be resolved. |
| 65. | Dikhu/Private/ Nagaland | NMPPL | 186 | 31.03.14 | EC yet to be obtained by developer. FC not applicable as forest land is not involved. EC proposal will be submitted in next 6-7 months. |

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|--------|-------------|--|--|
| 66. | Attunli/Private/ Arunachal Pradesh | AHEPCL | 680 | 2.07.18 | Both EC and FC are yet to be obtained. |
| | Sub Total | | 6266 | | |
| (c) Environment and Forest Clearance Subjudice | | | | | |
| 67. | Kotlibhel St-IA/ Central/ Uttarakhand | NHPC | 195 | 03.10.06 | <p>EC accorded on 9.05.07. FC-I accorded on 13.10.11 & for FC-II, Compliance Report is awaited from State Govt.</p> <p>The project is included in the list of 24 projects under review by Hon'ble Supreme Court.Hon'ble Supreme Court vide order dated 13.08.2013 directed the MoEF&CC as well as State of Uttarakhand not to grant any further Environmental Clearance for any hydropower projects in the State of Uttarakhand until further orders.</p> <p>In compliance to the above order, MoEF&CC constituted an Expert Body vide order dated 12.05.2015. Expert Body has given its report to MoEF&CC in Sept., 2017. The expert Body has recommended the project should operate to run one turbine continuously during lean season to minimize peaking impact at Devprayag.</p> |
| 68. | Kotlibhel St-IB/ Central/ Uttarakhand | NHPC | 320 | 31.10.06 | <p>EC accorded earlier on 14.08.07 is withdrawn on 22.11.10. MoEF&CC declined FC-I on 7.07.11.</p> <p>The project is included in the list of 24 projects under review by Hon'ble Supreme Court.Hon'ble Supreme Court vide order dated 13.08.2013 directed the MoEF&CC as well as State of Uttarakhand not to grant any further Environmental Clearance for any hydropower projects in the State of Uttarakhand until further orders. In compliance to the above order, MoEF&CC constituted an Expert Body. Expert Body has given its report to MoEF&CC in. The expert Body has recommended the project with a channel of around 700m long may be provided. Further, EB has recommended that the project should operate to run one turbine continuously during lean season to minimize peaking impact at Devprayag.</p> |
| 69. | Alaknanda/ Private/ Uttarakhand | GMRL | 300 | 08.08.08/ Revalidation up to 07.08.19 | <p>EC accorded on 12.3.08, FC-I accorded on 8.11.11. FC-II accorded on 09.11.2012. The project is included in the list of 24 projects under review by Hon'ble Supreme Court.</p> |

| 1 | 2 | 3 | 4 | 5 | 6 |
|-----|--|--------|-------|----------|---|
| 70. | Nyamjang Chhu/ Private/Arunachal Pradesh | NJCHPL | 780 | 24.03.11 | EC accorded on 19.4.12. FC-I accorded on 9.4.2012. NGT <i>vide</i> judgement dated 7.4.2016, has suspended EC till the time the studies as directed are to be carried out. WII study is under process. |
| 71. | Demwe Lower/ Private/Arunachal Pradesh | ADPL | 1750 | 20.11.09 | EC accorded on 12.02.10. FC-II accorded on 03.05.2013. As per NGT order dated 24.10.17, NBWL issue to be reconsidered by MoEF&CC. Financial closure yet to be obtained. Developer informed that interim Resolution Professional (IRP) has been appointed by The National Company Law Tribunal (NCLT) to resolve financial issues of the firm. |
| | Sub total | | 3345 | | |
| | Total (pending for E&F clearance) | | 23424 | | |

(%) Concurrence meeting date

ANNEXURE X

COST PER MEGAWATT DETAILS OF COAL BASED
THERMAL POWER PLANTS

As per the PIB Note Cost/MW details of Coal Based Thermal Power Plants namely Buxar TPP–2x660 MW and Khurja STPP–2x660 MW available in TPP&D Davison is as below:

| Sl. No. | Name of Project/ Implementing Agency | State | Capacity (MW) | Estimated Cost as per PIB Note (Rs. crs.) | Estimated Cost/ MW (Rs. crs.) |
|---------|--|------------------|----------------|---|-------------------------------|
| 1. | Buxar TPP SJVN Thermal (P) Limited | Bihar | 2x660= 1320 | 10,439 (including IDC & IFC) | 7.91 |
| 2. | Khurja STPP THDC India Ltd. | Uttar Pradesh | 2x660= 1320 | 11,089 (including IDC & IFC) | 8.4 |

ANNEXURE XI

LIST OF HYDRO ELECTRIC SCHEMES CONCURRED/APPRaised
BY CEA DURING LAST 5 YEARS

| Name of Project | Sector | State | Installed Capacity (MW) | Date of Concurrence | Estimated Cost | Cost/ MW |
|---------------------------|-------------------|---------------|-------------------------|---------------------|----------------|----------|
| New Ganderwal | J&K | State | 93 | 10.06.2014 | 965.86 | 10.39 |
| Chhatru | Himachal Pradesh | Private | 126 | 15.01.2015 | 1386.08 | 11.00 |
| Kalai-II | Arunachal Pradesh | Private | 1200 | 27.03.2015 | 14199.64 | 11.83 |
| Kynshi-I | Meghalaya | Private | 270 | 31.03.2015 | 3154.37 | 11.68 |
| Heo | Arunachal Pradesh | Private | 240 | 28.07.2015 | 1604.18 | 6.68 |
| Tato-I | Arunachal Pradesh | Private | 186 | 28.10.2015 | 1493.55 | 8.03 |
| Lower Kopili | Assam | State | 120 | 24.05.2016 | 1115.91 | 9.30 |
| Kiru | J&K | Joint Venture | 624 | 13.06.2016 | 4949.24 | 7.93 |
| Turga PSP | WB | State | 1000 | 05.10.2016 | 4234.9 | 4.23 |
| Kwar | J&K | Joint Venture | 540 | 23.02.2017 | 4391.05 | 8.13 |
| Tagurshit# | Arunachal Pradesh | Private | 74 | 21.10.2016 | 717.04 | 9.69 |
| Seli | Himachal Pradesh | Private | 400 | 27.10.2016 | 4118.59 | 10.30 |
| Sach Khas | Himachal Pradesh | Private | 267 | 27.10.2016 | 3390.74 | 12.70 |
| Loktak Downstream Manipur | | Central | 66 | 05.05.2017 | 1352.77 | 20.50 |
| Dugar | Himachal Pradesh | Private | 449 | 20.12.2016 | 3951.86 | 8.80 |
| Sawalkot | J&K | State | 1856 | 18.04.2018 | 22190.66 | 11.96 |
| Kirthai-II | J&K | State | 930 | 27.12.2016 | 5993.47 | 6.44 |
| Dibang | Arunachal Pradesh | Central | 2880 | 18.09.2017 | 25732.79 | 8.93 |
| Luhri Stage-I | Himachal Pradesh | Central | 210 | 01.05.2018 | 1912.59 | 9.11 |
| Attunli | Arunachal Pradesh | Private | 680 | 02.07.2018 | 6111.28 | 8.99 |
| | | | | | Average | 9.83 |
| | | | | | Minimum | 4.23 |
| | | | | | Maximum | 20.50 |

ANNEXURE XII

MINUTES OF THE 4th SITTING OF THE STANDING COMMITTEE ON
ENERGY (2018-19) HELD ON 29th OCTOBER, 2018 IN
COMMITTEE ROOM NO. '3', PARLIAMENT HOUSE
ANNEXE EXTENSION, NEW DELHI

The Committee met from 1100 hrs. to 1240 hrs.

PRESENT

Dr. Kambhampati Hari Babu – *Chairperson*

MEMBERS

Lok Sabha

2. Shri Bhagat Singh Koshyari
3. Dr. Arun Kumar
4. Shri Ravindra Kumar Pandey
5. Shri Vinayak Bhaurao Raut
6. Shri Bhanu Pratap Singh Verma

Rajya Sabha

7. Shri Oscar Fernandes
8. Shri Manish Gupta
9. Dr. Prabhakar Kore
10. Shri Narain Dass Gupta

SECRETARIAT

- | | | |
|-----------------------------|---|------------------------|
| 1. Ms. Rimjhim Prasad | – | <i>Joint Secretary</i> |
| 2. Shri N.K. Pandey | – | <i>Director</i> |
| 3. Ms. L. Nemjalhing Haokip | – | <i>Under Secretary</i> |

LIST OF WITNESSES

Ministry of Power

- | | |
|---------------------------|-----------------|
| 1. Shri Ajay Kumar Bhalla | Secretary |
| 2. Shri Aniruddha Kumar | Joint Secretary |

PSUs/Autonomous Body/Statutory Body

| | |
|-------------------------------|--|
| 3. Shri Prakash S. Mahske | Chairperson, CEA |
| 4. Shri P.D. Siwal | Member-CEA |
| 5. Shri J.S. Bawa | Chief Engineer, CEA |
| 6. Shri P.K. Shukla | Chief Engineer, CEA |
| 7. Shri Balraj Joshi | CMD, NHPC |
| 8. Shri Uday Shanker Sahi | Chief Engineer, NHPC |
| 9. Shri N.L. Sharma | CMD, SJVNL |
| 10. Shri D.V. Singh | CMD, THDC |
| 11. Shri A.G. West Khankongar | CMD, NEEPCO |
| 12. Shri D.K. Sharma | Chairman, BBMB |
| 13. Shri R.S. Jalta | Special Secretary, BBMB |
| 14. Shri J.P. Sharma | Joint Secretary, (Coordination), NEEPCO |
| 15. Shri K.V.S. Bawa | CMD, POSOCO |

2. At the outset, the Chairperson welcomed the Members of the Committee and the representatives of the Ministry of Power to the sitting of the Committee and apprised them of the agenda and focus area for the discussion and the provisions of Directions 55(1) and 58 of the Directions by the Speaker.

3. The Committee then *inter alia* deliberated upon the following points related to the subject Hydro Power with them:

- (i) Total Potential of Hydro Power in the Country— present installed capacity in the country, reasons for slow development of the sector.
- (ii) Share of Hydro in the total energy mix—reasons for fall in its share.
- (iii) Various problems being faced in the development of hydro sector - Land acquisition, Resettlement and Rehabilitation, lack of enabling infrastructure, long gestation period, high upfront cost in development of hydro power projects, law and order issue, etc.
- (iv) Need for coordination and cooperation between Central and State Government for optimum development of the sector.
- (v) Time taken in adjudication of matters related to hydro power sector.

(vi) Need for involvement of representatives of the people/
Members of Parliament with a view to resolve the local issues
being faced by the hydro power projects.

4. During the discussion, Members sought clarifications on various issues relating to the subject and the representatives of the Ministry replied to them. The Committee further desired that the details of the issues which were not available with the representatives of the Ministries may also be sent to them in due course.

5. The verbatim proceedings of the sitting of the Committee were kept on record.

The Committee then adjourned.

ANNEXURE XIII

MINUTES OF THE 7th SITTING OF THE STANDING COMMITTEE ON
ENERGY (2018-19) HELD ON 7th DECEMBER, 2018 IN COMMITTEE
ROOM D, PARLIAMENT HOUSE ANNEXE, NEW DELHI

The Committee met from 1100 hrs. to 1310 hrs.

PRESENT

Dr. Kambhampati Hari Babu – *Chairperson*

MEMBERS

Lok Sabha

2. Dr. Arun Kumar
3. Shri Ravindra Kumar Pandey
4. Shri Vinayak Bhaurao Raut
5. Shri Tokheho
6. Shri Nagendra Kumar Pradhan

Rajya Sabha

7. Shri T.K.S. Elangovan
8. Shri Oscar Fernandes
9. Shri Narain Dass Gupta
10. Shri Javed Ali Khan

SECRETARIAT

1. Shri N.K. Pandey – *Director*
2. Smt. L. Nemjalhing Haokip – *Under Secretary*

LIST OF WITNESSES

Ministry of Power

1. Shri Ajay Kumar Bhalla Secretary
2. Shri Sanjiv Nandan Sahai Addl. Secretary
3. Shri Aniruddha Kumar Joint Secretary

PSUs/Autonomous Body/Statutory Body

| | | |
|-----|---------------------|-------------------------|
| 4. | Shri Prakash Mhaske | Chairperson, CEA |
| 5. | Shri P.D. Siwal | Member, CEA |
| 6. | Shri Balraj Joshi | CMD, NHPC |
| 7. | Shri D.V. Singh | CMD, THDC |
| 8. | Shri M. Shiva | Director, NEEPCO |
| 9. | Shri N.L. Sharma | CMD, SJVNL |
| 10. | Shri D.K. Sharma | Chairman, BBMB |
| 11. | Shri R.S. Jalta | Special Secretary, BBMB |

Representatives from States

| | | |
|-----|---------------------|---|
| 12. | Smt. Radhika Jha | Secretary (Power), Uttarakhand |
| 13. | Shri Prabodh Saxena | Principal Secretary, Govt. of Himachal Pradesh |
| 14. | Shri P.K.S. Rohela | Chief Engineer, Directorate of Energy, Himachal Pradesh |
| 15. | Shri Hirdesh Kumar | Secretary, PDD, Govt. of J&K |
| 16. | Shri Anil Sharma | DGM, JKSPDC, Govt. of J&K |

2. At the outset, the Chairperson welcomed the Members of the Committee and the representatives of the Ministry of Power and the State Governments of Jammu & Kashmir, Himachal Pradesh, Mizoram, Sikkim and Uttarakhand to the sitting of the Committee and apprised them of the agenda and focus area for the discussion and the provisions of Directions 55(1) and 58 of the Directions by the Speaker.

3. The Committee then *inter alia* deliberated upon the following points related to the subject Hydro Power with them:

- (i) Total Potential of Hydro Power in the Country— present installed capacity in the country, reasons for slow development of the sector.
- (ii) Need to declare all hydro power irrespective of their capacity steps taken by the Government in this regard.
- (iii) Issues related to hydro power—levying of water cess by some of the States, utilization of Local Area Development fund, need for creation of enabling infrastructure by the Government(s), order related to enhancement of Environmental Flow.

- (iv) Issues specific to the State(s) of Jammu & Kashmir, Himachal Pradesh, Mizoram, Sikkim and Uttarakhand.
- (v) Financial issues—need to provide long tenure loans to hydro power projects at low interest rates, grants/aid by various agencies, loan from International Institutions.
- (vi) Time taken in adjudication of matters related to hydro power projects—need for coordination among various Ministries of the Central Government to resolve issues pertaining to the development of hydro sector, expediting the pending cases in the Apex Court and NGT.
- (vii) Need for involvement of representatives of the people/ Members of Parliament with a view to dispel various misconceptions related to hydro power and resolve the local issues.

4. During the discussion, Members sought clarifications on various issues relating to the subject and the representatives of the Ministry and the States replied to them. The Committee further desired that the details of the issues which were not available with the representatives of the Ministries may also be sent to them in due course.

5. The verbatim proceedings of the sitting of the Committee were kept on record.

The Committee then adjourned.

ANNEXURE XIV

MINUTES OF THE 8th SITTING OF THE STANDING COMMITTEE ON
ENERGY (2018-19) HELD ON 2nd JANUARY, 2019 IN ROOM NO. 111,
PARLIAMENT HOUSE ANNEXE EXTENSION, NEW DELHI

The Committee met from 1600 hrs. to 1645 hrs.

PRESENT

Dr. Kambhampati Hari Babu – *Chairperson*

MEMBERS

Lok Sabha

2. Shri Om Birla
3. Dr. Arun Kumar
4. Dr. (Smt) Pritam Gopinath Munde
5. Shri Ravindra Kumar Pandey
6. Shri Bhanu Pratap Singh Verma

Rajya Sabha

7. Shri Narayan Dass Gupta
8. Shri Manish Gupta
9. Shri Javed Ali Khan
10. Shri Shamsher Singh Manhas

SECRETARIAT

1. Ms. Rimjhim Prasad – *Joint Secretary*
2. Shri N.K. Pandey – *Director*

2. At the outset, the Chairperson welcomed the Members of the Committee and apprised them of the agenda for the sitting. Thereafter, the Committee deliberated upon the following draft Reports:–

- (i) Non-performing Assets in Gas Based Power Plants.
- (ii) Hydro Power.

