

Notes and news

Year-end review of the Ministry of Power

Electrification of approximately 2.6 crores households achieved 3,71,985 km of LT lines and 1,77,676 km of HT lines (11 kV and 33 kV) erected guidelines issued to all States/UTs to convert existing meters into smart ones, more than 9 lakh smart meters installed.

Availability of reliable and affordable energy is key for development of any country. Several steps have been taken to reform and strengthen the power sector as a whole including power generation, transmission and distribution. The details of year-long achievements for Ministry of Power are as under:

1. Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA)

- Launched in September 2017 with the objective to achieve universal household electrification by providing last mile connectivity and electricity connections to all remaining un-electrified households in rural and urban areas by 31st March, 2019
- Scheme outlay: Rs.16320 crores including GoI grant of Rs.12320 crores
- GoI grant released: Rs.5720 crores
- As on 31st March 2019, all states reported electrification of all willing households under 'Pradhan Mantri Sahaj Bijli Har Ghar Yojana' (Saubhagya), except few households in LWE affected Bastar region of Chhattisgarh.
- Electricity connections to 262.84 lakh households have been released from 11.10.2017 to 31.03.2019.
- Subsequently, seven states reported 19.09 lakh unelectrified households which were unwilling earlier but are now willing to get electricity connection. These households are being electrified by the concerned states and as on 20.12.2019, electricity connections to 7.42 lakh households have been released.

2. Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY):

- 100% villages across the country stands electrified as on 28th April, 2018.
- Total scheme outlay is Rs.75893 crores (DDUGJY:

Rs.43033 crores and RE component: Rs.32860 crores) projects with total cost of Rs. 43486 crores have been sanctioned in 32 states/UTs.

- Besides above, additional amount of Rs.14270 crores has been sanctioned for creation of additional infrastructure to support 100% household electrification.
- GoI grant released (including RE component)

Since 2014-15	-	Rs.45174 crores
During 2019-20 (Up to 24.12.19)	-	Rs.3857 crores
- Achievements as on 30.11.2019

Rural Electricity Infrastructure (including additional infrastructure created for household electrification under DDUGJY and Saubhagya)

- 1475 nos. new sub-stations commissioned
- 1658 nos. sub-stations augmented
- 4,92,181 nos. distribution transformers installed
- 3,71,985 km of LT lines and 1,77,676 km of HT lines (11 kV and 33 kV) erected
- 1,00,318 km feeder separation completed
- Metering.

Consumers	:	1.27 crores
Distribution transformers	:	1,73,559.
Feeders	:	11,425

Integrated Power Development Scheme (IPDS):

- Integrated Power Development Scheme (IPDS) was launched in the year 2014 with an outlay of Rs.32,612 crores for improving and augmenting the distribution and sub-transmission systems in urban areas with a view to improve reliability.
- Under the scheme, till today, system strengthening of sub-transmission and distribution network has been in 371 circles. 560 additional urban Towns have been IT-enabled, and about 30,000 kms of HT/LT lines have been installed across 546 circles in the country. 820 new substations have been constructed, while more than 50,000 Distribution transformers have been installed. For better work flow management in the Utilities, IPDS has also

TABLE 1: WORKS ACCOMPLISHED UNDER IPDS IN CURRENT FINANCIAL YEAR

Items	Unit	Achievement *April 2019 – 26 December 2019
Substations	New Substation	No. 200
	Capacity enhancement and additional transformers	No. 280
Over-head lines	HT (33 & 11kV)	CKm 5,143
	LT (440 V)	CKm 1,464
Cables	Aerial bunch/underground	CKm 19,050
Distribution transformers	No.	10,079
Meters	Smart/prepaid	No. 46,806
	Consumer-system	No. 20,533,72
Solar panels	kWp	12,347

funded Enterprise resource planning (ERP) across several Utilities, out of which implementation has been completed in 6 Utilities.

- Under the older projects subsumed under IPDS, till now, 1287 towns have been IT enabled, and SCADA systems have been completed in 57 towns. System strengthening works have been completed in 1195 towns.
- Significant progress has been made under the scheme in the current financial year with the physical progress of IPDS reaching almost 80% in the system strengthening works. The details of the works accomplished under IPDS in new projects in the current financial year are shown in Table 1:

SMART METERING

In the current financial year, Ministry of Power has issued guidelines to all states to convert all existing consumer meters into Smart meters in prepaid mode. Operation of smart meters in prepaid mode would allow consumers to pay as per their own financial convenience and electricity consumption requirements.

- EESL, a JV between CPSUs in the power sector, has been providing smart metering services to various utilities as per MOUs entered into with them. EESL has also established innovative financing arrangements for the Smart metering projects that would enable them to provide smart metering services to the DISCOMs without requiring any outright CAPEX funding from the States/Utilities. The recoveries against the funding towards smart metering installations would be taken as a monthly annuity from the Utilities over a period of seven to eight years.
- Apart from installations in NDMC for about 50,000 consumers, EESL has also started installation of Smart meters in Haryana, Uttar Pradesh, Bihar and Rajasthan. Out of these states, the maximum installation is in Uttar Pradesh, where more than 7.78 lakh smart meters have already been deployed across 11 cities.

More than 9 lakh smart meters have been installed in Uttar Pradesh, Haryana, Bihar, NDMC-Delhi and Andhra Pradesh

as detailed in Table 2:

TABLE 2

Name of State/ DISCOM	Smart meter installations by EESL
1 NDMC	56,220
2 Uttar Pradesh	7,78,631
3 Haryana	73,933
4 Andhra Pradesh	780
Total	9,09,564

Ujwal DISCOM Assurance Yojana (UDAY):

- Ujwal DISCOM Assurance Yojana (UDAY), a scheme for financial and operation turn around of power distribution companies (DISCOMs) was launched by the Government for state owned distribution utilities on 20-11-2015 at a time when the outstanding debts and losses of the distribution utilities had increased to levels that were adversely affecting the viability of the power and banking sectors. The purpose of UDAY was to usher reforms across the power and coal sectors through competitive and cooperative federalism to pave the way for 24x7 affordable and reliable power for all.
- UDAY incorporated a slew of measures, including financial re-engineering measures, as well as operational improvement measures. Exemptions were given to the states to borrow outside the FRBM limits in order to enable them to take over 75% of the outstanding debts of DISCOMs, as existing on 30th November 2015. The scheme had two outcome parameters: (i) AT&C loss reduction to 15%; and (ii) ACS-ARR gap reduction to zero by March 2019. Due to the large scale of problems/challenges in some States, as well as late joining, some States were given extension to complete the turnaround process by one or two years
- UDAY scheme is now in final stages, with majority of states having completed 3 years at the end of FY19. The performance from FY16 to FY18 (based on the data submitted by states on the UDAY portal) shows a

consistent improvement in AT&C losses, and reduction in annual losses by almost 50% of pre-UDAY times.

- Significant improvements have been observed in terms of reduction in AT&C loss from 20.7% in FY16 to 18.2% in FY19. The lines losses have come down to below the levels of 20%, due to an increase in billing and collection of revenues, reduction in theft, and reduction in technical losses. The states like Bihar, Haryana, Rajasthan, Jammu and Kashmir and Manipur have increased the billing efficiency by ~ 8-10%. In many states, like Assam, Goa, Himachal Pradesh, and Meghalaya, collection efficiency has improved by more than 5%.
- Similarly, the gap between ACS and ARR has reduced from 59 paise per unit in FY16 to 27 paise per unit in FY19 due to cost side optimization measures including control in power purchase costs, and reduction in interest costs, and discipline in revision of tariff filings in most of the states.
- Half yearly trends of performance of UDAY states in FY20 indicate that the AT&C losses are lesser than those in the same period by 62 basis points, though there is a marginal deterioration in the revenue gaps. Variation in pattern of electricity consumption due to extent of heat and rainfall accounts for these variations.
- The Government of India is formulating additional reform frameworks to buttress the efforts under UDAY to achieve a complete financial and operational turnaround of State owned Utilities.

HYDRO

- 16% higher generation (120.7 BU) in 2019-20 (April ~ Nov.) from generation (103.9 BU) in 2018-19 (April ~ Nov.)
- Mangdechhu hydropower project (720 MW) in Bhutan commissioned in August 2019 and inaugurated by Prime Minister on 17.08.2019
- CCEA approval of Rs.1600 crores in July 2019 for pre-investment activities of NHPC's Dibang Multipurpose (2880 MW) project in Arunachal Pradesh, the largest hydropower project to be initiated in the country.
- Revival of Subansiri Lower (2000 MW) project in Arunachal Pradesh, the largest under construction hydropower project, which was stalled since December 2011 due to local unrest and NGT case, has been re-started after NGT case was dismissed on 31.07.2019 and local issues were resolved.
- Revival of Teesta-VI (500 MW) project in Sikkim, which was stalled since December 2012 through NHPC's take over of the project through NCLT bidding.
- On the advice of the Central Govt., the state governments of hydro-rich states of Jammu & Kashmir and Himachal Pradesh have provided relaxations to reduce tariff of hydropower projects:

- Jammu & Kashmir has deferred free power, exempted water cess for 10 years and have given exemptions from local taxes to Kiru and Kwar projects.
- Himachal Pradesh has also deferred free power, agreed for 50% reimbursement of State GST and for booking 1.5% LADF to any head other than project cost, BOOT/ BOOM for 70 years etc, with an objective to bring down hydro tariff below Rs. 4.5 per unit. On these lines, Govt. of Himachal Pradesh signed agreements with 3 CPSUs viz. NTPC, NHPC and SJVN for setting up 10 hydropower projects of 2917 MW on Chenab river entailing an investment of about Rs. 28,000 crores.
- Guidelines being prepared for operationalising the following measures to promote hydropower sector approved by the Union Cabinet on 07.03.2019 :
 - Declaring large hydropower projects (>25 MW) as renewable energy
 - Hydropower purchase obligation(HPO)
 - Tariff rationalisation measures
 - Budgetary support for flood moderation component and
 - Budgetary support for enabling infrastructure like bridges, roads etc.

The saleability issues facing hydropower would be addressed through HPO, tariff rationalisation measures and budgetary support for flood moderation and enabling infrastructure like roads, bridges etc. Large Hydropower projects (>25 MW) would also become eligible for green funding after being categorised as renewable energy source.

ONE NATION-ONE GRID-ONE FREQUENCY

- Expansion of ISTS transmission lines (220 kV and above) by 14,546 km
 - Transformation capacity addition of ISTS network by 74,910 MVA
 - Inter-regional transfer capacity of addition of 5,700 MW
- MoP has approved implementation of ISTS transmission projects worth about Rs.15,186 crores under RTM/TBCB mode.

SETTING UP OF RENEWABLE ENERGY MANAGEMENT CENTRE (REMC)

Eight REMCs have been commissioned in Andhra Pradesh, Karnataka, Tamil Nadu, Madhya Pradesh, Maharashtra and Gujarat and Southern Regional Load Despatch Centre and Western Regional Load Centre during 2019. These REMCs would help in grid integration of renewable energy by taking care of intermittency of RE generation and, facilitating real time forecasting, scheduling and real time tracking of renewable energy generation.

RESTORATION WORK DURING ODISHA CYCLONE

Provided support by way of manpower, material and other support to the tune of Rs.11.48 crores for early restoration of

transmission lines/ power system in the state of Odisha, which was badly affected by the cyclone 'Fani'

IMPORTANT WORKS DONE IN JAMMU & KASHMIR

- 220 kV transmission line/system from Srinagar to Leh, via Drass and Kargil was commissioned in February, 2019, but due to collapse of a few towers during the avalanche was not fully functional. This was restored and made fully operational.
- Restoration of Kishenpur-New Wanpoh transmission lines in J&K, affected by the recent snow storm in Kashmir, was completed under adverse weather conditions and difficult terrain
- MoU signed and Work commenced in two CSR projects in J&K at an estimated cost of Rs.5.78 crores
 - Improvement/upgradation of inner link road at Wagoora.
 - Upgradation of 10 Army Goodwill Schools in J&K.

SRINAGAR-DRASS-KARGIL-KHALSTI-LEH TRANSMISSION SYSTEM

On 3rd February, 2019, Prime Minister Narendra Modi dedicated the 220kV Srinagar-Drass-Kargil-Khalsti-Leh transmission system aimed at powering Kargil and Ladakh region of Jammu & Kashmir thereby, connecting these regions of India to the national grid.

MAHARATNA STATUS

Power Grid Corporation of India Limited (POWERGRID) has been conferred with the coveted Maharatna status by the Government of India on 23.10.2019.

POWER RAIL KOYLA AVAILABILITY THROUGH SUPPLY HARMONY (PRAKASH) PORTAL

PRAKASH portal was launched on 03.10.2019. Benefits of Portal to the Stakeholders: On a single platform, the following information will be available:

- Coal company: Stocks and the coal requirement at power stations
 - Indian Railways: Actual coal available at siding.
 - Power stations can plan future schedule by knowing rakes in pipe line and expected time of receipt
 - MoP/MoC/Ministry of Railways/CEA/POSOCO can review the overall availability of thermal power in different regions and coal available for the same
- Information available on portal
- Summary Dashboard: Summary of generation, coal receipt for power plants, dispatch by coal company and rake placement by Railways for month and financial year.
 - Geo status: Summary of power plant and siding details on Map of India.
 - Reports: Following report will be available
 - Daily power plant status: Report gives station data related

to power generation, coal receipt, consumption and stock.

- Plant exception report: Report gives Station list having given stock on particular date.
- Periodic power plant status: Report gives station data related to power generation, coal receipt, consumption and stock for selected period. Coal materialization based on dispatch by coal company is available.
- Coal dispatch report: Report gives subsidiary wise coal dispatch for particular period. It also gives source wise details of dispatch. Dispatch trend is also visible.

TRANSPORT SECTOR

“Charging Infrastructure for Electric Vehicles - Guidelines and Standards” were issued on 14.12.2018 which were subsequently revised on 01.10.2019.

- Public Charging Stations Installed by NTPC/EESL till December 2019:
 - NTPC : 57
 - EESL : 65

ENERGY EFFICIENCY IN INDUSTRY SECTOR

- After the completion of PAT 2 cycle involving 621 designated consumers from 11 sectors, BEE has undertaken monitoring and verification process. It is estimated that these 621 large consumers would achieve energy saving target of 9.5 million tonnes of oil equivalent annually which is equivalent to reduction of 35 million tonnes CO₂ emissions for the country.
- National conclave on Enhancing Energy Efficiency in MSME's held on 23-24th September, 2019. Two new numbers of Energy Management Centres established in 2019. Energy Conservation Guidelines for MSME sector was published.

ENSURING SUSTAINABILITY OF POWER SECTOR - ADDRESSING ISSUE OF PAYMENT DELAYS BY DISCOMS

- The Central Government has taken a major step to address the problem of mounting outstanding dues towards generating companies by the distribution companies by issuing an Order on 28th June, 2019 regarding opening and maintaining of adequate Letter of Credit (LC) as Payment Security Mechanism under Power Purchase Agreements by Distribution Licensees. This mechanism has been made effective w.e.f 1st August, 2019.
- Under this mechanism the power will be scheduled for dispatch only after Letter of Credit (LC) for the desired quantum of power with respect to the generating stations has been opened. It shall be ensured by the concerned Load Despatch Centre that such entity, during the period of non-scheduling of power on account of Non opening of LC or advance payment, has no access to procure power from the power exchange(s) and they shall not be granted Short Term Open Access (STOA).

- The measure is expected to improve payments to the power generators and improve sustainability in the power sector.

MEASURES TOWARDS REDUCTION OF COST OF POWER TO THE CONSUMER

- In order to reduce the cost of power procured by the distribution licensees, a new system has been put in place where for inter-state generating stations (ISGS), the merit order dispatch at national level shall be followed. Hence the cheapest generation will be available at the maximum level. This is a step where for ISGS, the state level merit order has been shifted to national level merit order. This mechanism has resulted in savings of approximately Rs 3 Crores every day and has a potential of saving Rs.1200 crores in a year towards power procurement cost of distribution licensees.
- An order was issued by Ministry of Power on 15.11.2019 on “Reduction in cost of power due to pre-payment in entire value chain of power sector”. Electricity Regulatory Commissions are requested to take necessary actions in reduction of cost due to pre payment as in such cases the working capital requirements get reduced. This initiative reduces the cost of power to the consumer.

PROMOTION OF RENEWABLE ENERGY

- In order to promote the capacity addition of solar and wind power projects, the waiver available for use of inter-state transmission system (ISTS transmission charges and losses) has been extended for use of inter-state transmission system (ISTS) for transmission of electricity by solar or wind power projects commissioned till December 2022. The waiver shall be applicable for the twenty five years from the commissioning of such projects.
- Clarification on orders related to renewable purchase obligation for captive power plants (CPP) has been issued on 1st February 2019.

Allowing use of linkage coal for short term power procurement and power exchanges

- For the first time, linkage coal was allowed to power plants for selling power in the day ahead market (DAM) through power exchanges or in short term through a transparent bidding process through Discovery of Efficient Energy Price (DEEP) portal. A methodology in this regard was issued by Ministry of Power on 2nd December 2019.
- Till now the coal linkage was granted to power generating stations only for selling power through long term and medium term power purchase agreements. This move shall de-stress the power generating stations which have not secured long term or medium term power purchase agreements.

REVIVAL OF STRESSED ASSET : PILOT SCHEME II

In our endeavour for revival of the stressed assets, a pilot scheme was introduced by MOP in April 2018 to facilitate procurement of aggregated power of 2500 MW for three years (covered under medium term) from the generating companies having coal based power plants which are already commissioned without having a power purchase agreement for the quantum of power the bidder is willing to bid. Based on the experience gained in the pilot scheme, Pilot Scheme – II for procurement of another 2500 MW for the period of three years under medium term was notified on 01.02.2019.

Eleven Renewable Energy Management Centers (REMCs) dedicated to the nation

The Minister of State (IC) Power and New & Renewable Energy & Minister of State (Skill Development and Entrepreneurship), Mr. R. K. Singh inaugurated the Northern Region Renewable Energy Management Centre (NR-REMC) at a function in New Delhi recently. On the occasion, the Minister dedicated to the nation, eleven REMCs, placing India among a league of few nations, which have state-of-the-art management centers for renewable energy integration.

While speaking at the event Mr. Singh congratulated all those who planned the green corridors and REMCs and said that they are showing more vision that was shown by Europe and United States when they started at renewable energy management.

The Government of India’s target of 175 GW RE capacity by 2022 driving accelerated RE penetration poses challenges to the grid management due to intermittent and variable nature of RE generation. The renewable energy management centers are equipped with artificial intelligence based RE forecasting and scheduling tools and provide greater visualization and enhanced situational awareness to the grid operators. The Renewable Energy Management Centers (REMCs) are co-located with the State Load Dispatch Centers (SLDCs) in Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh, Gujarat and Rajasthan and in RLDCs at Bengaluru, Mumbai and New Delhi and at the NLDC. Presently, 55 GW of renewable (solar and wind) is being monitored through the eleven REMCs.

The Government of India had approved the implementation of the REMCs as a Central Scheme and had mandated POWERGRID, a Maharatna CPSE under Ministry of Power as Implementing Agency. These REMCs are being managed by Power System Operation Corporation of India Ltd. (POSOCO) at Regional and National level and at State level by State Load Dispatch Centres (SLDCs).

During the event the minister also released a Report by POSOCO on “Analysis of Impact of Solar Eclipse – 26th Dec’19 on Indian Power System”. The report covered various areas such as solar generation forecasting, ramp estimation, behaviour of PV plants during solar eclipse. The variation in

global horizontal irradiance during solar eclipse for plants falling in annular and partial eclipse zone have been analysed in the report.

India to stop import of thermal coal from FY 2023-24

India will stop importing thermal coal from Financial Year 2023-24, said Union Minister of Coal and Mines Mr. Pralhad Joshi while chairing "Chintan Shivir" - a two day brainstorming session. The session was organized to find a way forward for the coal sector - at Kevadia in Gujarat on 17th and 18th February 2020.

"The Shivir has engaged the participants in contemplating and deliberating to think out of the box to overcome various bottlenecks and provide innovative solutions to the Indian coal sector" Mr. Pralhad Joshi said while interacting with the media on the sidelines of the Shivir.



Highlighting key takeaways of the Shivir, the Union Coal and Mines Minister said that various ways and means were discussed with key stakeholders to achieve 1 billion tonnes (BT) coal production target by Coal India Limited (CIL) by Financial Year 2023-24. The Ministry of Coal will coordinate with Indian Railways and Shipping Ministry and enable CIL, captive and commercial miners evacuate more coal by 2030. Stressing upon the diversification in the Indian coal sector, the Minister said that ideas have also been mooted that CIL could think of coming up with the state of the art pithead thermal power plants to transform it into an integrated energy company. It was also proposed that CIL could generate 5 GW of solar power by FY 2023-24 and could diversify into coal gasification with a target of 50 million tonnes by 2030 enabling a sustainable energy mix for the country. All these ideas will be deliberated, studied and examined for their feasibility in detail and based on that, they could be implemented.

The Minister further stressed upon the safety of workers in the coal mining sector and has urged coal companies to achieve zero mortality rate by FY 2023-24. He also announced that the Ministry of Coal will introduce a "Coal Minister's Award" soon to recognize and appreciate best practices in



coal production, productivity, safety, sustainability etc. by the coal companies.

The Minister further stated that drilling agencies like Central Mine Planning and Design Institute (CMPDI) and Geological Survey of India (GSI) should benchmark their operations to global standards by digitizing their databases. He added that it will enable better utilization in years to come.

During the two-day Shivir, strategies were evolved for sustainable mining, environmental conservation, use of clean coal technologies and for extending helping hand to all stakeholders in and around coal mining areas to coexist in a mutually sustainable manner.

Togo hands over letter of engagement to NTPC as PMC for about 300 MW solar power projects in Togo

The Letter of Engagement of NTPC as PMC for development about 300 MW solar power projects by Togo was handed over here today by Mr. Kondi Mani, Charge d' Affaire, Embassy of Togo, New Delhi, to Mr. Gurdeep Singh, CMD (NTPC), in the august presence of Shri R. K. Singh, Minister of Power & RE (GoI) and President of ISA Assembly. Mr. Upendra Tripathy, Director General (ISA) was also present.

Speaking on the occasion, Mr. R K Singh expressed his happiness over the development and stated that RE project offers cheaper power. This resource must be harnessed by ISA member countries as RE makes it possible to supply electricity to people living in far-flung areas through distributed power supply model. He underlined the importance of independent regulators upon stating that under recently evolving model prepaid smart metering helps in smooth billing and collection and the governments need not invest in the projects which developers take care.

Togo is a country in West Africa and Member of International Solar Alliance (ISA). The country has set an ambitious plan to achieve universal electricity access by 2030 with focus on capacity addition in solar power generation.

The country has taken various initiatives to achieve these targets. The country has been requesting assistance of ISA for development of solar capacity in the country.

ISA has been taking various initiatives to assist the member countries to develop solar projects. Presently there are 6 programmes of ISA to develop solar capacities in Member Countries which include agricultural pumps, mini grids, rooftop solar, large scale grid connected projects etc. The programme on large scale grid connected projects on solar park model was approved in 2nd Assembly held on 30th October 2019. Implementation of ISA programmes are member driven and ISA Secretariat facilitates the implementation.

NTPC Limited is a power major and a public sector company of the Government of India, owning an installed power capacity of more than 58,000 MW which include 870 MW of solar projects and 1062 MW under development. Apart from development of own solar projects, the company has been the nodal agency for development of more than 4000 MW of solar projects on IPP model.

Engagement of NTPC by Togo for PMC, based on endorsement of ISA: NTPC had submitted a proposal to ISA requesting endorsement of ISA to member countries to give Project Management Consultancy (PMC) to the member countries for implementation of solar projects.

As per NTPC proposal, in ISA member countries where solar projects are implemented through competitive bidding, NTPC may act as a project management consultant (PMC). NTPC will carry out various activities for selection of solar project developers (SPDs) on competitive basis for setting up projects on ownership basis and enter into power purchase agreement with government-designated entities. The scope of PMC includes presentations to the concerned ministries and other stakeholders in ISA countries for structuring of projects, assistance to bring out enabling policy and regulatory framework for competitive procurement of solar power, bid process management for selection of project developers on competitive basis, structuring PPA, roof/land leasing agreements etc. The PMC charges of NTPC will be recovered from the selected SPDs. NTPC based on the feasibility, may also develop solar projects by putting own equity in countries where feed in tariff is in force.

ISA Endorsement of NTPC: The proposal of NTPC, after review by ISA Advisory Committee, was put on Swiss challenge for 28 days on ISA website. Subsequently, the proposal was submitted to ISA Finance Committee. Based on the concurrence of Finance Committee, the proposal has been cleared in 2nd ISA Assembly.

Based on the above, a Letter of Endorsement was given to NTPC for extending PMC services and circulated to all the National Focal Points (NFPs) of ISA member countries. There will not be any direct cost implications to the member countries. However, the engagement of NTPC for PMC is the

sole discretion of a member country.

NFP (National Focal Point) of Togo, based on the endorsement of ISA has sent a communication to DG ISA for engaging NTPC for the PMC services for development of solar PV projects/parks on 70 hectares of identified land in Dapaong (Dalwak Region: capacity more than 33 MW) and on 500 hectares of identified land in Mango (Savanes Region: capacity about 250 MW). Togo is the first ISA country to avail the services of NTPC.

Power generation from conventional sources registered annual growth of 5.45%

The total power generation from conventional fuel sources including hydro and renewable energy sources has registered a compound annual growth rate of 5.45% from 1.17 billion units (BU) in 2015-16 to 1.38 BU in 2018-19. Stating this in a written reply in the Rajya Sabha recently. Mr. R.K. Singh stated that generation from hydro power projects mainly depends on the availability of water. Power generation from hydro sources has registered a compound annual growth rate of 3.3% from 0.121 BU in 2015-16 to 0.134 BU in 2018-19. Hydro power generation has not been lowered down as part of any policy.

Realizing the need for development of hydropower projects, especially the pumped storage projects due to growing need of peaking and balancing power, Mr. Singh said that Government of India have approved a number of measures in March, 2019 for promoting hydro power sector including, declaring large hydro power (LHPs) (>25 MW projects) as renewable energy source, mandating Hydro Purchase Obligation (HPO) as a separate entity within Non-solar Renewable Purchase Obligation (RPO) from new projects, tariff rationalization measures for bringing down hydro power tariff, budgetary support for Flood Moderation/storage Hydroelectric projects (HEPs) and towards cost of enabling infrastructure, i.e. roads/bridges. As a result of these measures, the capital cost as well as the project tariff would be reduced especially in initial years which would improve project viability & salability, and thus, promote the hydroelectric projects.

He added that although the generation of power depends on its demand, there is no decline in power generation from conventional sources including hydro. Generation of power from conventional sources has shown a compound annual growth rate of 4.09% from 1.1 BU in 2015-16 to 1.25 BU in 2018-19.

Proposals for construction of dams

Twenty seven project proposals involving construction of new dams in different States have been received in Central Water Commission (CWC) since April, 2016. Out of these, 7 proposals have been accepted by Advisory Committee of DoWR, RD & GR and 5 proposals have been returned to the

State Governments due to the deficiencies. Acceptance of remaining proposals by the Advisory Committee depends upon satisfactory compliances by the concerned State Governments on the observations of CWC.

As intimated by the Ministry of Environment, Forests and Climate Change, 11 projects have been granted Environmental Clearance (EC) for the construction of dams from 01.01.2017 to 31.12.2019. Environmental Clearance has been given after duly appraising the individual EIA & EMP reports, consideration of Public Hearing and Rehabilitation & Resettlement issues and including merits and development of the area with respect to the projects. Thereafter, when EAC recommended the grant of Environmental Clearance to these projects, approval from the Competent Authority has been taken for grant of Environmental Clearance.

Sweden and India announce co-funding for a multi-million dollar programme on Smart Grids

India-European Union Flagship Call on Integrated Local Energy Systems was announced at India Smart Utility Week 2020 in the presence of Prof Ashutosh Sharma, Secretary, Department of Science & Technology (DST) and European Union Ambassador to India Mr Ugo Astuto.

This partnership between Indian and European Union will help in Clean Energy and Climate and this partnership will foreseestrengthened cooperation in energy research and innovation, mainly in renewable energy and its integration in the energy system. The collaboration can make energy supply cleaner, more efficient and affordable to all.

This Indo-EU flagship call is fully in line with both the European Union's and India's involvement in Mission Innovation (MI), a global initiative of 24 countries and the European Commission (on behalf of the European Union), committed to reinvigorate and accelerate global clean energy innovation with the objective to make clean energy widely affordable.

This Indo-EU Flagship call will give novel solutions encompassing local integration across various energy vectors and increase the share of renewables in the energy mix and high energy efficiency.

Meanwhile, Sweden and India have announced the India-Sweden Collaborative Industrial Research & Development Programme at India Smart Utilities Week. The joint Programme, co-funded by Indian Department of Science & Technology (DST) and Swedish Energy Agency, will bring together world class expertise of Sweden and India to address challenges in the area of Smart Grids.

Prof Ashutosh Sharma, Secretary, DST and Dr Robert Andren, Director General, Swedish Energy Agency signed the Protocol of Cooperation between Swedish Energy Agency and DST discussed how this will benefit both countries.

“With India raising its ambition for renewable energy



manifold, research, development and innovation the area of Smart Grids assumes high priority as essential enabler. High research development and innovation investments, especially, in partnership and collaborations, can accelerate Smart Grid technologies development in the near future. Sharing the common vision on sustainability, Sweden and India are adding one more collaborative programme to their already vibrant partnership portfolio,” said Professor Prof Sharma.

He said that during the last five years DST has set up 3 major international smart grids networked virtual centers and partnered with 24 countries for smart grids research, development and innovation. As co-lead of Mission Innovation (MI) Smart Grids innovation challenge, DST has supported 9 MI projects envisaging partnership of 17 Indian and 20 Foreign Institutions across 9 countries. DST has already made an investment of 60 million US \$ in Smart Grids.

India-Sweden Industrial led Research & Development collaborative programme on Smart Grids at a collective investment of 5 Million US \$ will help to transform the clean energy sector into a secure, adaptive, sustainable and digitally enabled ecosystem and provide reliable and quality energy for all.

Speaking about the new programme from Stockholm, Dr Andren said, “Regardless of the differences between our countries, we share the objectives of a sustainable society and future. A sustainable energy supply is a prerequisite for all societies and therefore we need modern power infrastructures that allow highly increased amounts of renewable energy. Another common challenge we share is the transformation into a fossil free transport sector. These are just two examples of areas where India and Sweden can benefit from concrete co-creation and sharing experiences from each other”.

“India is a highly valued partner to Sweden and the fastest rising research and innovation power in the world. The Sweden and India joint programme will assure that the best of Swedish and Indian innovators can forge partnerships and

develop solutions that will benefit both sides”, said Mr. Klas Molin, Ambassador of Sweden to India.

DST, Government of India and Swedish Energy Agency have created a funding mechanisms through which companies may seek support for joint Research and Development projects. The India-Sweden programme aims to foster and support the development of collaborative Research and Development projects that bring together companies, research organisations, academics and other collaborators from both countries for the joint development of innovative products or processes. The project should aim to develop technologies that can be commercialized after two years through cooperation between India and Sweden.

The Swedish Energy Agency commits 2.6 MUSD over four years for research and innovation collaboration in the area of smart grids with India. DST will also fund a matching investment of INR 18 Crore for the support of Indian partners towards industrial Research and Development projects, focused on co-development and innovation towards new products, processes or technologies. Product Adaptation projects will be funded under this new programme.

The Sweden-India Science and Innovation Partnership has grown in strength during the last couple of years. High-level visits from both sides have further boosted interest in bilateral collaboration between the two countries. The first ever India-Sweden High Level Dialogue on Innovation Policy was held in New Delhi during the state visit of their Majesties the King and Queen of Sweden to India in December 2019.

Thermal power plants to have 2,43,034 MW capacity by 2021-22

The Minister of State for Power, New & Renewable Energy Mr. R.K. Singh informed the Lok Sabha in a written reply recently that as per the extant National Electricity Plan, the installed capacity of thermal power plants of the country, comprising coal based and gas and diesel based plants, is likely to be 243,037 MW in 2021-22 out of a total projected installed capacity of 479,419 MW. The plant load factor (PLF) of coal based capacity in 2021-22 is likely to be 56.5%.

He added that generators supplying power under Power Purchase Agreement (PPA) will not suffer financial loss due to underutilization of their power generation capacity as they are entitled to full recovery of fixed charges from the beneficiaries subject to achieving the normative availability.

The Minister further said that the PLF/generation of thermal, (coal/lignite based) stations depends on total electricity demand in the country which is affected by climate/weather conditions, growth of electricity demand in various sectors and generation from various other sources like hydro, nuclear, gas etc. Besides “Must Run Status” has been accorded to renewable energy projects (solar, wind and small hydro). Power from such sources get dispatched on priority

and is generally fully utilized. The generation from the hydro power plants is commensurate with availability of water and is generally fully utilized. Thus, the utilization of coal/lignite based plants depends on balance generation required from thermal stations and the position of the particular plant in the merit order, resulting in thermal stations generally operating on low PLF. The PLF of gas based generation is low due to non-availability of gas in the country.

The Minister also informed the House that the government is exploring the possibility of use of cost effective energy storage system e.g. pumped storage hydro plant, Battery storage etc. so that the electricity generated during off peak period can be stored for use during peak period. This would lead to better utilisation of power generation capacity of thermal power plants.

Contribution of renewable energy sources is estimated to be around 21%

As per Central Electricity Authority’s National Electricity Plan, contribution of renewable energy sources is estimated to be around 21% of the total electricity demand of the country in the year 2021-22 and 24% by 2026-27.

The major efforts being taken by the Government to meet the targets of renewable energy in the country, inter-alia, include Permitting Foreign Direct Investment (FDI) up to 100 percent under the automatic route, strengthening of Power Purchase Agreements (PPAs), mandating requirement of Letter of Credit (LC) as payment security mechanism by distribution licensees for ensuring timely payments to RE generators, setting of ultra mega renewable energy parks to provide land and transmission on plug and play basis to investors, waiver of inter-state transmission system (ISTS) charges and losses for inter-state sale of solar and wind power for projects to be commissioned by 31st December, 2022, notification of standard bidding guidelines to enable distribution licensee to procure solar and wind power at competitive rates in cost effective manner, declaration of trajectory for renewable purchase obligation (RPO) up to the year 2022, laying of transmission lines under Green Energy Corridor Scheme for evacuation of Power in renewable rich states, launching of new schemes, such as, PM-KUSUM, Solar Rooftop Phase II, 12000 MW CPSU Scheme Phase II, etc.

As part of Intended Nationally Determined Contributions under the Paris Accord on Climate Change, India has made a pledge that by 2030, 40% of its installed power generation capacity shall be from non-fossil fuel sources and will reduce its carbon emission intensity of GDP by 33-35 % considering 2005 level. The Government has set a target to install 175 GW of renewable energy capacity in the country by the year 2022. This includes 100 GW from solar, 60 GW from wind, 10 GW from biomass and 5 GW from small hydro power.

A 8000 cr National Mission on Quantum Technologies & Applications

The government in its budget 2020 has announced a National Mission on Quantum Technologies & Applications (NM-QTA) with a total budget outlay of Rs 8000 crores for a period of five years to be implemented by the Department of Science & Technology (DST). The new economy is based on innovations that disrupt established business models. Artificial intelligence, Internet-of-Things (IoT), 3D printing, drones, DNA data storage, quantum computing, etc., are re-writing the world economic order.”

“Quantum technology is opening up new frontiers in computing, communications, cyber security with wide-spread applications. It is expected that lots of commercial applications would emerge from theoretical constructs which are developing in this area. It is proposed to provide an outlay of ` 8000 crores over a period five years for the National Mission on Quantum Technologies and Applications.”

Quantum technologies are rapidly developing globally with a huge disruptive potential. The next generation transformative technologies that will receive a push under this mission include quantum computers and computing, quantum communication, quantum key distribution, encryption, crypt analysis, quantum devices, quantum sensing, quantum materials, quantum clock and so on. The areas of focus for the Mission will be in fundamental science, translation, technology development, human and infrastructural resource generation, innovation and start-ups to address issues concerning national priorities.

Their applications which will receive boost include those in aero-space engineering, numerical weather prediction, simulations, securing the communications & financial transactions, cyber security, advanced manufacturing, health, agriculture, education and other important sectors with focus on creation of high skilled jobs, human resources development, start-ups and entrepreneurship leading to technology lead economic growth.

The range of quantum technologies is expected to be one of the major technology disruptions that will change entire paradigm of computation, communication and encryption. It is perceived that the countries who achieve an edge in this emerging field will have a greater advantage in garnering multifold economic growth and dominant leadership role.

The transition of quantum science and technology from a field of active interest in research laboratories to one that can be applied in day to day life is also the opportune moment that provides the space for many startup companies to form and develop. The Mission draws upon the existing deep strengths within academic institutes across India to support interdisciplinary research projects in key verticals involving quantum technology, while simultaneously developing key foundational strengths in important core areas. QT research,

operational implementations, Human resource availability and technology development are in rudimentary stage.

It has become imperative both for government and industries to be prepared to develop these emerging and disruptive technologies in order to secure our communications, financial transactions, remain competitive, drive societal progress, generate employment, foster economic growth and to improve the overall quality of life.

The Mission will be able to address the ever increasing technological requirements of the society, and take into account the international technology trends and road maps of leading countries for development of next generation technologies. Implementation of the mission would help develop and bring quantum computers, secured communications through fibre and free space, quantum encryption and crypt-analysis and associated technologies within reach in the country and help address India specific national and regional issues.

The mission will help prepare next generation skilled manpower, boost translational research and also encourage entrepreneurship and start-up ecosystem development. By promoting advanced research in quantum science and technology, technology development and higher education in science, technology and engineering disciplines India can be brought at par with other advanced countries and can derive several direct and indirect benefits.

Quantum Technology is based on the principles of quantum theory, which explains the nature of energy and matter on the atomic and subatomic level. It concerns the control and manipulation of quantum systems, with the goal of achieving information processing beyond the limits of the classical world. Quantum principles will be used for engineering solutions to extremely complex problems in computing, communications, sensing, chemistry, cryptography, imaging and mechanics. Quantum field has not yet matured for commercialization, due to the extreme scientific challenges involved.

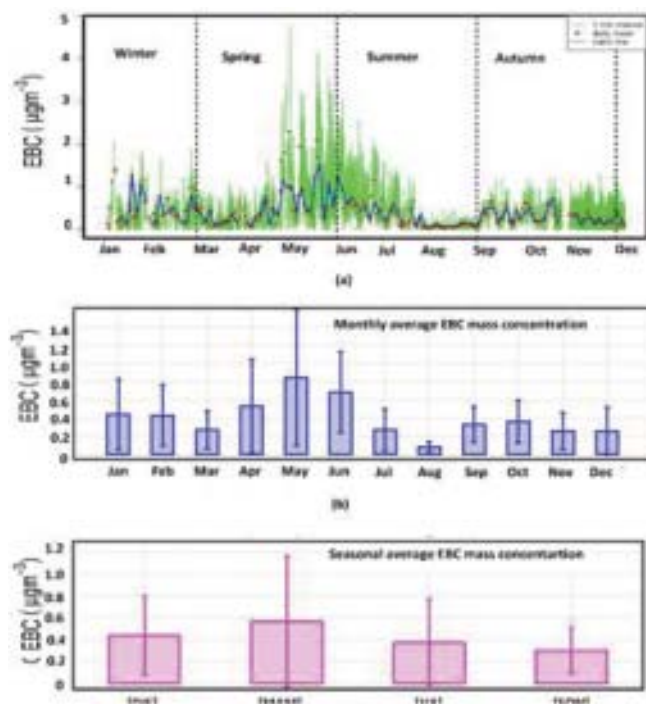
Quantum computers store and process information using quantum two level systems (quantum bits or qubits) which unlike classical bits, can be prepared in superposition states. This key ability makes quantum computers extremely powerful compared to conventional computers when solving certain kinds of problems like finding prime factors of large numbers and searching large databases. The prime factorization quantum algorithm has important implications for security as it can be used to break RSA encryption, a popular method for secure communication. Indian physicists and engineers are preparing for a deep dive into the quantum world that holds the secrets for developing exciting technologies for computing, communication, cryptography and many more.

With a solid research base and workforce founded on significant and reliable government support, it can lead to the

creation of innovative applications by industries, thereby stimulating economic growth and job creation, which will feed back into a growing quantum-based economy. The government's financial and organizational support will also ensure that both public and private sectors will benefit. It will establish standards to be applied to all research and help stimulate a pipeline to support research and applications well into the future.

Black carbon from agricultural burning and forest fire may influence melting of Gangotri glacier

The already receding Gangotri glacier seems to have more bad news in store. Black carbon concentration in the region increases by 400 times during summer, according to a study. The study suggests agricultural burning and forest fire as the reason behind this seasonal increase. This can trigger glacial melt because of the light-absorbing nature of black carbon.



Daily, monthly, and seasonal variation of BC mass concentration during 2016/ at Chirbasa station near Gangotri glacier

Scientists from Wadia Institute of Himalayan Geology, (WIHG), an autonomous institution under Department of Science & Technology, in a study conducted at Chirbasa station near Gangotri glacier, for the year 2016, found that black carbon (BC) concentration in this region has changed drastically during summer. It was revealed by investigating the occasional high values of black carbon extricated, that the seasonal cycle of increase was significantly influenced by the emissions resulting from agriculture burning (in western part of the country), forest fires (along the Himalayan slopes) in summer, and to some extent by the contribution from long-range transport of pollutants in winter, depending the

prevailing meteorological conditions. The research led by Dr. P.S. Negi from WIHG was published in the scientific journal Atmospheric Environment.

The Equivalent black carbon (EBC) aerosols contribute significantly towards global warming due to its light-absorbing nature. Their presence in the eco-sensitive zone, such as the Himalayan glacier valleys, is a matter of serious concern and needs to be meticulously monitored. However, baseline data on BC is rarely available from most of the glaciated Himalayan region.

For the first time, the team of Scientists from WIHG carried out measurements on ambient EBC mass concentration at a high altitude site Chirbasa (3600 m), near Gangotri glacier in the Indian Himalaya, during the year 2016. The monthly mean concentration of EBC was found to be minimum in August and maximum in the month of May. The observed seasonal mean concentrations of EBC indicated a pristine glacial source and absence of EBC sources in the locality.

ARCI develops fuel cell technology for disaster management

The Scientists at International Advanced Research for Powder Metallurgy & New Materials (ARCI), Hyderabad, an autonomous R&D Centre of Department of Science and Technology (DST) have developed polymer electrolyte membrane fuel cells (PEMFC).

PEMFC, in its entirety, have an advantage of operational capability at low-temperatures with applications in decentralised power generation systems. Through intense R&D efforts in the area of fuel cell technologies, ARCI at its Centre for Fuel Cell Technology, Chennai has developed in-house PEMFC systems in the power range of 1 to 20 kW and demonstrated the same in stationary (1-20 kW) and transport applications (1,3,5 kW). Emergency Operation Centres (EOC) backed with 10 kW system along with fuel cell stack (providing sustainable electricity using hydrogen gas without



PEMFC stack of 5 kW capacity

TABLE 3: NUCLEAR POWER PLANTS

The details of projects under construction and new projects accorded sanction are as follows:

Project	Location & State	Type	Capacity (MW)	Sanctioned Cost (Rs. crore)
Projects under Construction				
KAPP 3&4	Kakrapar, Gujarat	PHWR	2 × 700	11459 [#]
RAPP 7&8	Rawatbhata, Rajasthan		2 × 700	12320 [*]
GHAVP 1&2	Gorakhpur, Haryana		2 × 700	20594
KKNPP 3&4	Kudankulam, Tamil Nadu	LWR	2 × 1000	39849
PFBR	Kalpakkam, Tamil Nadu	FBR	1 × 500	5677
New Projects accorded Administrative approval & financial sanction				
KKNPP 5&6	Kudankulam, Tamil Nadu	LWR	2 × 1000	49621
Chutka-1&2	Chutka, Madhya Pradesh	PHWR	2 × 700	105000
Kaiga-5&6	Kaiga, Karnataka		2 × 700	
MahiBanswara-1&2	MahiBanswara, Rajasthan		2 × 700	
GHAVP- 3&4	Gorakhpur, Haryana		2 × 700	
MahiBanswara-3&4	MahiBanswara, Rajasthan		2 × 700	

[#] under revision to Rs 16580 crore

^{*} under revision to Rs. 17079 crore

PHWR – Pressurised Heavy Water Reactor LWR – Light Water Reactor FBR – Fast Breeder Reactor

the need of grid power), air moving sub systems, power control devices and control and monitoring system is being planned as a natural disaster management measure.

Natural disasters are consequences of calamities like earthquake, landslide, cyclone, flood, tsunami, and so on that affects human activities. Tamil Nadu is generally affected by five to six cyclones every year, of which two to three are severe. There has been a paradigm shift in the focus of disaster management, from response-centric (rescue, relief, rehabilitation, and reconstruction) to laying greater emphasis on the other elements of disaster management cycle (prevention, mitigation, and preparedness) as a means to avert the impact of future emergencies.

The Government of Tamil Nadu places equal importance on both the approaches and is keen to develop a robust disaster management system. The latest concept in disaster management all over the world is about conversion of control rooms to Emergency Operation Centres (EOC). EOCs respond immediately during an emergency situation with State-of-the-Art communication systems. This helps in providing immediate support during the Golden Hour of the disaster.

Hence, the State Government decided to look at the prospect of converting the existing control room to EOC backed with 10 kW system along with fuel cell stack, air moving sub systems, power control devices and control and monitoring system. Fuel cell systems offer a potential benefit in terms of providing sustainable electricity using hydrogen gas without the need of grid power as required by conventional battery backup systems. Recently, ARCI demonstrated feasibility of providing power to EOCs. PEMFC stack with capacity of 5kW has been installed on mobile truck and demonstrated on December 5, 2019 at Tamil Nadu State

Disaster Management Authority (TNSDMA). Dr. J. Radhakrishnan, Commissioner, Revenue Administration and Disaster Management witnessed the demo and appreciated the prowess of PEMFC technology.

ARCI is now planning to set up a PEMFC system up to 10 kW capacity at Tamil Nadu State Emergency Operation Centre (TN SEOC) to operate the systems like early warning systems, VHF set, IP phone, BSNL Ethernet and office equipment like scanner, computers, printers, phone, FAX and normal requirements like lighting and fan.

The pressurised heavy water reactors (PHWRs) are fuelled by natural uranium while light water reactors (LWRs) are fuelled by low enriched uranium. The annual requirement of fuel (UO₂) of a 700 MW PHWR (at 85% capacity factor) is about 125 tons and that of a 1000 MW LWR (at a capacity factor of 90%), about 25 tons. Prototype fast breeder reactor (PFBR) being implemented by Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI) is fuelled by mixed oxide (MoX) fuel.

The installed power generation capacity, utilisation and production cost per unit of each of the nuclear power plants in the country, nuclear plant-wise;

National river conservation programme

State/Union Territory-wise details of the projects launched by the Government under National River Conservation Plan during the last three years are as Table 5:

Cleaning of river is a continuous process and Government of India is supplementing the efforts of the state governments in addressing the challenges of pollution of rivers by providing financial and technical assistance.

TABLE 4

Unit	State	Location	Capacity (MW)	Capacity Utilisation (PLF), 2019-20 (upto Jan 20)	Electricity Tariff (Paise/kWh)
TAPS-1	Maharashtra	Tarapur	160	81.15	206.24
TAPS-2			160	90.91	
TAPS-3			540	76.62	307.64
TAPS-4			540	94.86	
RAPS-1*	Rajasthan	Rawatbhata	100	-	—
RAPS-2			200	77.54	349.06
RAPS-3			220	88.98	
RAPS-4			220	98.41	
RAPS-5			220	99.88	406.28
RAPS-6			220	95.07	
NAPS-1	Uttar Pradesh	Narora	220	98.03	320.32
NAPS-2			220	97.51	
KAPS-1	Gujarat	Kakrapar	220	86.36	249.06
KAPS-2			220	101.52	
KGS-1	Karnataka	Kaiga	220	94.01	364.84
KGS-2			220	91.58	
KGS-3			220	93.85	
KGS-4			220	98.50	
MAPS-1#	Tamil Nadu	Kalpakkam	220	-	279.73
MAPS-2			220	94.13	
KKNPP-1		Kudankulam	1000	80.15	412.06
KKNPP-2			1000	49.58	

* RAPS-1 is under extended shutdown for techno-economic assessment for continued operation.

#MAPS-1 is in project mode for Endshield related works.

TABLE 5

State/UT	Name of the Project/river	Sanctioned cost (Rs. in crore)	Sanction Date	Funds Released by Central Govt. (Rs. in crore)	Expenditure incurred by the State Govt. (incl. State Share) (Rs. in crore)
Jammu & Kashmir	Pollution abatement of river Devika and Tawi at Udhampur	186.74	Sept,2018	30.00	13.00
Gujarat	Pollution abatement of river Tapi at Surat, Gujarat	971.25	March, 2019	13.00	—
Sikkim	Pollution abatement of river Rani Chu in Zone-III, Gangtok	94.66	July, 2018	27.00	17.00
Manipur	Pollution abatement of river Nambul at Imphal, Manipur	97.72	Jan, 2019	18.00	3.30

Under the National River Conservation Plan (NRCP), project proposals are received from the state government from time to time for taking up pollution abatement works in towns along various rivers, and are considered for financial assistance on a cost sharing basis subject to their conformity with the scheme guidelines, pollution status, prioritizations, appraisal by independent institutions and availability of plan funds. The NRCP has so far covered

polluted stretches of 34 rivers in 77 towns spread over 16 states in the country with a sanctioned cost of Rs.5870.54 crores. A Central share of Rs.2510.63 crores has been released to the state governments for implementation of various pollution abatement schemes. A sewage treatment capacity (STP) of 2522.03 mld (million litres per day) has been created under the NRCP resulting in reduction in pollution load being discharged into various rivers.