## Before UTTARAKHAND ELECTRICITY REGULATORY COMMISSION

## Petition No. 34 of 2025

## In the Matter of:

Petition for Investment Approval for "Supply & erection of Substation Automation System (SAS) at 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja"

#### And

## In the Matter of:

Power Transmission Corporation of Uttarakhand Limited (PTCUL) 'Vidyut Bhawan', Near ISBT, Majra, Dehradun.

.....Petitioner

## Coram

Shri M.L. Prasad Shri Anurag Sharma Chairman Member (Law)

Date of Order: March 24, 2025

## <u>ORDER</u>

This Order relates to the Petition filed by Power Transmission Corporation of Uttarakhand Ltd. (hereinafter referred to as "PTCUL" or "the Petitioner") vide letter No. 349/Dir. (Operations)PTCUL dated 20.02.2025 seeking Investment Approval for "Supply & erection of Substation Automation System (SAS) at 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja" under Para 11 of Transmission Licence. [Licence No. 1 of 2003].

## 1. Background

1.1 The Petitioner vide letter No. 3610/MD/PTCUL/UERC dated 25.10.2024 has submitted the following proposal for investment approval:

Sl. No.	Particulars	Scheme cost (excluding IDC)	Total Project Cost as per DPR including IDC (in Crore)
1	Substation Automation System (SAS) Implementation at 39 Nos of PTCUL Substations	271.15	283.15

1.2 Besides this Petitioner has also submitted a letter No. 349/Dir. (Operations) PTCUL dated 20.02.2025 requesting the Commission to consider and accord investment approval for "Supply & erection of Substation Automation System (SAS) at 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja" on a priority basis, considering the urgency of the matter, as for the said project an amount of Rs. 1.37 Crore has been approved under SASCI scheme and the fund to be received needs to be utilized before 31.03.2025.

Sl. No.	Particulars	Scheme cost (excluding IDC)	Total Project Cost as per DPR including IDC (in Crore)
1	Supply & erection of Substation Automation System (SAS) at 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja	11.14	11.30

- 1.3 The Commission took cognizance of the same and allowed to admit the proposal of Supply & erection of Substation Automation System (SAS) at 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja, and with regard to SAS work of remaining 37 substations the admission and further proceedings will be dealt separately. Therefore, the proposal of Supply & erection of Substation Automation System (SAS) at 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja is being dealt in this Order and proceeding of rest of the projects shall be dealt separately.
- 1.4 With regard to the urgency of the installation of 02 nos. SAS on the aforementioned substations the Petitioner has emphasized the crucial role of the 220 kV Kamaluaganja substation in supplying power to hilly areas and submitted that after installation of SAS at 220/132/33 kV Kamaluaganja, and 220/33 kV Jafarpur,

PTCUL will be able to effectively monitor and control the transmission and distribution of electrical power. Further petitioner submitted, substation automation refers to the use of advanced technologies to optimize the management of power transmission and distribution systems. Jaffarpur is also a vital link between the Kashipur network and the power exchange between Uttar Pradesh and Uttarakhand and SAS installation will play crucial role in reducing the downtime, ensuring seamless power exchange between the two States, and minimizing the supply disruptions. Similarly, the supply to the hill network is fed through the 220 kV Chandak-Almora line, which is the only available source in the region. Kamaluaganja is a key substation that connects the hill network with the 220 kV substation at Pantnagar. Installing SAS at Kamaluaganja will strengthen grid stability, support efficient energy transmission, enhance operational reliability, improve fault response time, and contribute to overall grid resilience. Substation automation refers to the use of advanced technologies to optimize the management of power transmission and distribution systems. It involves deploying a range of substation and feeder operating functions and applications, such as supervisory control and data acquisition (SCADA) systems and integrated volt-var control, to enhance operation and maintenance efficiencies. The deployment of substation automation can bring many benefits to power systems. By eliminating errors, redundancies, and inefficiencies, it can increase the productivity of power system. It can also help prevent electrical outages by enabling real-time monitoring and control of the power grid. Additionally, SAS is a key enabler for integrating with the smart grid, allowing for real time monitoring, advance automation, and improved grid efficiency. 220/33 kV Jafarpur, and 220/132/33 kV Kamaluaganja are critical in terms of congestion in power flow network therefore, the work of SAS installation for these substations were proposed under SASCI for faster completion of the work.

1.5 The Petitioner further submitted that the Public Investment Board, headed by the Chief Secretary, Government of Uttarakhand (GoU), has also accorded approval for Rs. 10.55 Crore in its meeting dated 05.02.2025. Out of this approved amount, the State government contributed Rs. 1.37 Crore (comprising a loan of Rs. 0.959 Crore and equity of Rs. 0.411 Crore), while the balance project cost will be borne

by PTCUL through its internal resources. It has been informed by the Petitioner that utilization certificate has to be submitted to GoU before 31.03.2025.

- 1.6 The Petitioner in its Petition has mentioned that the estimated cost proposed in the DPR has been prepared on the basis of the approved PTCUL SoR 2023-24.
- 1.7 The Petitioner has submitted a copy of the extract of Minutes of 92nd meeting of the Board of Directors (BoD) of PTCUL held on 27.08.2024, wherein the Petitioner's Board has approved the Corporation's proposal for Substation Automation System (SAS) Implementation at 39 Nos substations as stated below:

"RESOLVED THAT the consent of the Board be and is hereby accorded to approve the Detailed Project Report for Implementation of SAS at 39 Substations at total scheme cost of Rs. 283.15 Cr. with IDC & Rs. 271.15 Cr. without IDC.

RESOLVED FURTHER THAT the aforesaid DPR be submitted to Hon'ble UERC for investment approval.

RESOLVED FURTHER THAT the Managing Director and/or Director (Finance) and/or Company Secretary be and are hereby jointly and severally authorized to approach to REC/PFC/NABARD/HUDCO/nationalized banks and other financial Institution as they deem fit and proper and tie-up the loan component with a debt equity ratio of 70:30.

RESOLVED FURTHER THAT the Managing Director and/or Director (Finance) and/or Company Secretary be and are hereby jointly and severally authorized to accept the lowest interest rates offered by the institution along with other suitable terms and conditions and execute the loan documents along with other legal papers. under the common seal of the Company wherever required, creation of charge by following the prescribed procedure of law.

RESOLVED FURTHER THAT all legal deeds and documents as may be executed and such other legal acts as may be performed by the Managing Director. Director (Finance) and Company Secretary in connection with obtaining the aforesaid loan shall be deemed to have been approved by the Board of Director for which the board hereby undertake to ratify and confirm.

RESOLVED FURTHER THAT the action so taken shall be brought before the Board for their information."

- 1.8 To justify the need and urgency for the aforesaid proposed two Substation Automation System (SAS) projects, the Petitioner has submitted that:
  - 1.8.1 The Petitioner is committed for strengthening the State transmission infrastructure by adopting advanced technologies that enhance operational efficiency, reliability, and system automation. In line with this objective, PTCUL has proposed the implementation of Substation Automation System (SAS) at 220 kV Jafarpur and 220 kV Kamaluaganja substations under the SASCI scheme. The said work is proposed under SASCI scheme. SASCI has approved Rs 1,37,00,000 till date for the aforementioned work. The remaining amount of Rs. 7,33,30,324.16 has to be met from either SASCI or REC/PFC/NABARD HUDCO/ Nationalized Banks and other financial institutions as they deem fit. The fund received from SASCI has to be utilized before 31.03.2025 and utilization certificate has also to be submitted in the matter. Currently, these substations operate with conventional control and protection systems, requiring significant manual intervention for monitoring, operation, and maintenance. The deployment of SAS-based automation will enable real-time data acquisition, remote operation, and advanced fault diagnostics, leading to improved system performance and reduced downtime.
- 1.9 On preliminary examination of the aforesaid two proposals submitted by the Petitioner, certain deficiencies/shortcomings were observed as mentioned below, which were communicated to the Petitioner vide Commission's letter No. 1622 dated 11.03.2025. In reply to the deficiencies raised by the Commission, the Petitioner submitted vide letter no.504/Dir has its reply (Operations)/PTCUL/UERC dated 17.03.2025. The queries raised by the Commission and subsequent clarification submitted by the Petitioner are as follows:

- **Query 1:** PTCUL in its DPR has emphasized over and over again that SAS installation will yield significant cost savings through improved efficiency and reduced down time but hasn't backed its claims with any specific data. PTCUL is required to submit the expected cost saving and expected reduction in down time. In this regard please provide the down time details of these substations for past three years together with events durations and causations.
- It is humbly submitted that PTCUL is working in hybrid mode which means Reply 1: the control of some of the operating equipments can be done through SAS however some mechanism cannot be controlled through automation system for example breakers can be controlled through automation system but at the same time the isolators and earth switches cannot be operated through the SAS as they are not motorized. These equipments have been proposed to be replaced under PSDF (Power System Development Fund). There are many factors and policy decisions responsible for cost savings such as reduction in manpower, reduction in downtime, saving of life of equipments by improved efficiency and predictive maintenance etc. Again its quantification may depend on the size of the switch yard speed of the operating personnel and operating individual's reaction time for specific conditions. These are intangible benefits of which quantification is very complex and can be done only by some authorized research agencies. Therefore, it is sure that after installation of SAS there shall be a cost saving however quantification of the cost savings in such complex and mixed system is not possible. It's obvious that reduction in downtime must be there by reducing manual intervention and uses of automatic make and break of operating equipments.

Some organizations have made certain studies regarding above on the basis of studies here's a detailed explanation of how SAS (Substation Automation System) installation can yield significant cost savings through improved efficiency and reduced downtime, backed by specific data:

#### Improved Efficiency

**1.** *Reduced manual intervention:* SAS automates many substation operations, reducing the need for manual intervention. This saves time and

reduces labor costs. A study by the Central Power Research Institute (CPRI) found that SAS can reduce manual intervention by up to 60% in Indian substations. (Source: CPRI, "Substation Automation Systems")

**2. Optimized energy distribution:** SAS enables real-time monitoring and control of energy distribution, reducing energy losses and improving overall efficiency. A study by the Power Grid Corporation of India Limited (PGCIL) found that SAS can reduce energy losses by up to 8% in Indian transmission systems. (Source: PGCIL, "Smart Grid Initiatives")

**3.** *Predictive maintenance:* SAS enables predictive maintenance, reducing downtime and extending the lifespan of substation equipment. A study by the Indian Institute of Technology (IIT) Bombay found that predictive maintenance enabled by SAS can reduce downtime by up to 40% in Indian substations. (Source: IIT Bombay, "Predictive Maintenance for Substations")

## Reduced Downtime

**1. Real-time monitoring:** SAS enables real-time monitoring of substation equipment, allowing for quick detection and response to faults. A study by the Tata Power Delhi Distribution Limited (TPDDL) found that SAS can reduce fault detection time by up to 85% in Indian distribution systems. (Source: TPDDL, "Smart Grid Initiatives")

**2.** Automated fault clearance: SAS enables automated fault clearance, reducing downtime and improving overall reliability. A study by the Maharashtra State Electricity Transmission Company Limited (MSETCL) found that SAS can reduce fault clearance time by up to 70% in Indian transmission systems. (Source: MSETCL, "Smart Grid Initiatives")

**3.** Reduced maintenance time: SAS enables remote monitoring and control, reducing the need for on-site maintenance and minimizing downtime. A study by the Gujarat Energy Transmission Corporation Limited (GETCO) found that SAS can reduce maintenance time by up to 50% in Indian transmission systems. (Source: GETCO, "Smart Grid Initiatives")

Cost Savings

**1. Reduced labor costs:** SAS automates many substation operations, reducing the need for manual labor and resulting in cost savings. A study by the CPRI found that SAS can reduce labor costs by up to 25% in Indian substations. (Source: CPRI, "Substation Automation Systems")

2. Reduced energy losses: SAS enables real-time monitoring and control of energy distribution, reducing energy losses and resulting in cost savings. A study by the PGCIL found that SAS can reduce energy losses by up to 8% in Indian transmission systems, resulting in cost savings of up to ₹1,200 crores per annum. (Source: PGCIL, "Smart Grid Initiatives")

**3. Extended equipment lifespan:** SAS enables predictive maintenance, extending the lifespan of substation equipment and resulting in cost savings. A study by the IIT Bombay found that predictive maintenance enabled by SAS can extend equipment lifespan by up to 15% in Indian substations. (Source: IIT Bombay, "Predictive Maintenance for Substations")

In conclusion, SAS installation can yield significant cost savings through improved efficiency and reduced downtime. By automating substation operations, optimizing energy distribution, and enabling predictive maintenance, SAS can reduce labor costs, energy losses, and equipment maintenance costs, resulting in cost savings.

- **Query 2:** As PTCUL mentioned the SAS will improve the efficiency and reliability of the transmission infrastructure, doesn't that mean the availability of PTCUL's infrastructure will increase with installation of SAS and accordingly the benchmark for that should be increased.
- **Reply 2:** The installation of SAS (Substation Automation System) will indeed improve the efficiency and reliability of the transmission infrastructure, which in turn will increase the availability of the infrastructure. Therefore, it is logical to assume that the benchmark for availability should be increased to reflect the improved performance of the transmission infrastructure.

In fact, the Central Electricity Regulatory Commission (CERC) in India has specified that the availability of transmission systems should be at least 98.5% for interstate transmission systems and 98% for intra-state transmission systems. With the installation of SAS, it is reasonable to expect that these benchmarks can be increased to 99% or higher.

By increasing the benchmark for availability, the transmission system operators will be incentivized to maintain and operate their systems at even higher levels of efficiency and reliability, which will ultimately benefit the consumers and the overall power sector.

So, the benchmark for availability should be increased with the installation of SAS to reflect the improved performance of the transmission infrastructure. In this regard it is humbly submitted that PTCUL has already better or at par transmission system availability as set by Hon'ble CERC therefore there is no need for raising the benchmarks. PTCUL has to maintain the same for future.

- **Query 3:** Presently two S/s are considered for SAS installation, hence, PTCUL is required to submit the improvement with regard to response time, efficiency, availability and cost saving in this regard, in case SAS installation will be allowed. For the purpose: PTCUL is also required to submit pre and post installation changes w.r.t above parameters in the mentioned two Substations. Also to provide the breakup of cost saving in terms of manpower, maintenance and operational expenses as mentioned in the DPR.
- Reply 3: It is humbly submitted that PTCUL is working in hybrid mode which means the control of some of the operating equipments can be done through SAS however some mechanism cannot be controlled through automation system for example breakers can be controlled through automation system but at the same time the isolators and earth switches cannot be operated through the SAS as they are not motorized. These equipments have been proposed to be replaced under PSDF (Power System Development Fund). There are many factors and policy decisions responsible for cost savings such as reduction in manpower, reduction in downtime, saving of life of equipments by improved efficiency and predictive maintenance etc. Again its quantification may depend on the size of the switch yard speed of the operating personnel and operating individual's reaction time for specific conditions. These are intangible benefits of which quantification is very

complex and can be done only by some authorized research agencies. Therefore it is sure that after installation of SAS there shall be a cost saving however quantification of the cost savings in such complex and mixed system is not possible. It's obvious that reduction in downtime must be there by reducing manual intervention and uses of automatic make and break of operating equipments.

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In conclusion, SAS installation can yield significant cost savings through improved efficiency and reduced downtime. By automating substation operations, optimizing energy distribution, and enabling predictive maintenance, SAS can reduce labor costs, energy losses, and equipment maintenance costs, resulting in cost savings. **Query 4:** Since, SCADA, WAMS, PMUS etc. are specific hardware and software solutions and originally PTCUL has sought installation across 39 substations, will it not be difficult to develop system just for two substations and later for other substations, if approved, and to integrate the same with the existing and upcoming SAS simultaneously. Also, PTCUL is required to submit the expected cost implication, in case separate tenders will be issued.

SCADA, WAMS and PMUS are modern solutions must required for

**Reply 4:** achieving towards smart grid. These are the fastest developing technologies which are expected to grow and change in due course of time and has the adaptability/flexibility to incorporate those changes in future. Therefore, there will be no difficulty in integration of SAS in these two substations with rest of the substations to be implemented with SAS in future. However the implementation of SCADA (Supervisory Control and Data

Acquisition), WAMS (Wide Area Monitoring System), and PMU (Phasor Measurement Unit) is mandated by various guidelines and regulations issued by the following authorities:

**1. Central Electricity Regulatory Commission (CERC):** CERC has issued regulations and guidelines for the implementation of SCADA, WAMS, and PMU in the grid.

**2.** *Central Electricity Authority (CEA):* CEA has issued technical standards and guidelines for the implementation of SCADA, WAMS, and PMU in the grid.

**3.** *Power Grid Corporation of India Limited (PGCIL):* PGCIL, being the central transmission utility, has issued guidelines and standards for the implementation of SCADA, WAMS, and PMU in its transmission systems.

**4.** *Ministry of Power (MOP):* MOP has issued policies and guidelines for the implementation of smart grid technologies, including SCADA, WAMS, and PMU, in the power sector.

Some specific guidelines and regulations that mandate the implementation of SCADA, WAMS, and PMU include:

-CERC (Grid Standards) Regulations, 2010

# -CEA (Technical Standards for Transmission Systems) Regulations, 2013

## - PGCIL (SCADA/WAMS/PMU Implementation Guidelines) - MOP (Smart Grid Policy)

These guidelines and regulations aim to ensure the reliable and efficient operation of the Indian power grid, and the implementation of SCADA, WAMS, and PMU is a critical component of this effort.

If approval is given in same financial year there should not be any cost difference except at certain locations depending upon the geographical location and techno-commercial circumstances. The cost estimate has been prepared on the basis of SOR 2024 of PTCUL therefore the cost will not change until present SOR is not changed. Therefore cost implication is dependent on the time taken in providing investment approval and SOR 2024 of PTCUL during the time of tender floating. Hence it cannot be predicted as on today.

- **Query 5:** In the financial analysis PTCUL has considered sale revenue for the cost-benefit comparison, PTCUL is required to submit the calculation, as to how the sale revenue has been considered.
- **Reply 5:** The detailed calculation of sales revenue is provided in the submitted DPR, specifically on pages 26 to 30.

## 2. Commission's Observations, Views and Directions:

- 2.1. Based on the submissions made in the Petition and subsequent submissions of the Petitioner, the Commission observed that:
  - 2.1.1 The Petitioner has requested to consider supply and erection of Substation Automation Systems (SAS) at two substations, namely 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja under Phase-1 on priority, with the remaining 37 substations to be covered under Phase-2. The Petitioner has sought expedited approval for these initial two projects, citing urgency and priority.
  - 2.1.2 As per the request of petitioner, the Commission in the present proceedings has focused on the requirement of SAS in the two substations mentioned

above and all the queries, views, justifications etc. are considered specifically for these two substations only.

- 2.1.3 Petitioner has specifically claimed the benefits of SAS, like improvement in efficiency, cost savings, reduction in down time etc. but could not sustain its claim with any proper data and results. In reply to query of Commission the petitioner has mentioned certain studies but did not commensurate them with proper data and comparisons. Also, the petitioner has not assessed and demonstrated the specific improvements and benefits that they are expecting with regard to their substations in case SAS is allowed to be installed.
- 2.1.4 The petitioner has informed that in Kumaon region all their 200 kV and 400 kV substations, other than Jafarpur and Kamaluaganja substations, have SAS arrangements but nowhere in the petition and also in the reply on queries, the petitioner has compared the performance of their own substations having SAS and that which don't have this facility. Since petitioner has the first-hand experience of the SAS facility it was expected that they should have better data and projection on outcome in case SAS is allowed. Also, the reduction in manpower that have been achieved in SAS enabled substations as compared to non-SAS substations is not informed.
- 2.1.5 The Breakeven point analysis submitted by petitioner in support of Cost-Benefit analysis is not calculated based upon the benefit derived out of implementation of scheme rather the same is shown as mere mathematical calculation not having much of the merit in it. The benefits are not quantified in monetary terms and are more intangible in nature.
- 2.1.6 It is observed by the Commission that the urgency is sought by the Petitioner with regard to the two substations because the same have got sanction of funds from GoU under SASCI scheme, however the funds made available through the SASCI route are actually the small part of the overall requirement and therefore in future it is suggested that Petitioner should try and engage itself only in cases where considerable financial support is received through SASCI.

- 2.1.7 From the extract of the Minutes of 99<sup>th</sup> meeting of BoD of PTCUL it is noticed that the L-1 bidder has already been derived in the matter and BoD has given its approval to award the work of Rs. 7,37,54,512 + GST. The urgency part of the Petition is brought before the Commission on post facto basis. The Petitioner had earlier been cautioned not to bring Petitions for seeking investment approval after completion of tendering process. Such inaction on the part of the Petitioner is in contravention to conditions of License and MYT Regulations. Hence, the Commission once again warns the Petitioner to refrain from any such highly reprehensible practices in future and show utmost compliance of the Act/Regulations/License/Orders of the Commission. However, considering that some funding is made available through SASCI means and its clearance is received as late as 24.02.2025, the same is dealt as an exceptional scenario and accordingly is considered by the Commission.
- 2.1.8 Further, Commission thinks that it would be a better approach to go ahead with installation of SAS in two substations first rather than allowing for 39 substations in one go and to consider the rest later, based on feedback and analysis of performance and accepted achievement as assured by the Petitioner after installation of SAS in these two substations.
- 2.1.9 Commission acknowledges that SAS installation in 220 kV and above grid substations may be helpful in maintaining different aspects of the substation in a better and more efficient way, at the same time it is also warranted that the benefits should be more observable rather than just theoretical in nature and accordingly the Petitioner is directed to submit the detailed report of performance in the matter in due course of time once the SAS in above mentioned two substations are installed, also submit the comparison in performances considering pre-SAS and post SAS scenarios.
- 2.2. Based on the above observations and submissions of PTCUL, the Commission hereby grants in-principle approval for 'Supply & erection of Substation Automation System (SAS) at 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja' as shown in the table given below and directs the Petitioner to go

ahead with the aforesaid work subject to strict fulfilment of the conditions mentioned below:

Sl. No.	Particulars	Total Project Cost as per DPR including IDC (Rs. Crore)	Project Cost considered by the Commission (including IDC) (Rs. Crore)
1	Supply & erection of Substation Automation System (SAS) at 220/33 kV Substation Jafarpur and 220/132/33 kV Substation Kamaluaganja	11.30	11.05

- (i) All the loan conditions as may be laid down by the funding agency in their detailed sanction letter are strictly complied with.
- (ii) The Petitioner shall, within one month of the Order, submit a letter from the State Government or any such documentary evidence in support of its claim for funding agreed by the State Government or any other funding agency as mention the extract of Minutes of meeting of BoD of PTCUL.
- (iii) After completion of the aforesaid projects, the Petitioner shall submit the completed cost and financing of the projects.
- (iv) The Petitioner shall submit the detailed report of performance in the matter in due course of time once the SAS in above mentioned two substations are installed, also submit the comparison in performances considering pre-SAS and post SAS scenarios.
- (v) The cost of servicing the project cost shall be allowed in the Annual Revenue Requirement of the Petitioner after the assets are capitalized and subject to prudence check of cost incurred and subject to the decision in SoR matter pending before the Commission.
- 2.3. The approval is given subject to the above conditions and on the basis of submissions and statement of facts made by the Petitioner in the Petition under affidavit, therefore, violations of the condition and in case any information provided, if at any time, later on, is found to be incorrect, incomplete or relevant information was not disclosed, and which materially affects the basis for granting

the approvals, in such cases the Commission may cancel the approval or refuse to allow the expenses incurred in the ARR/True-up apart from initiating plenary action.

Ordered accordingly.

(Anurag Sharma) Member (Law) (M.L. Prasad) Chairman