



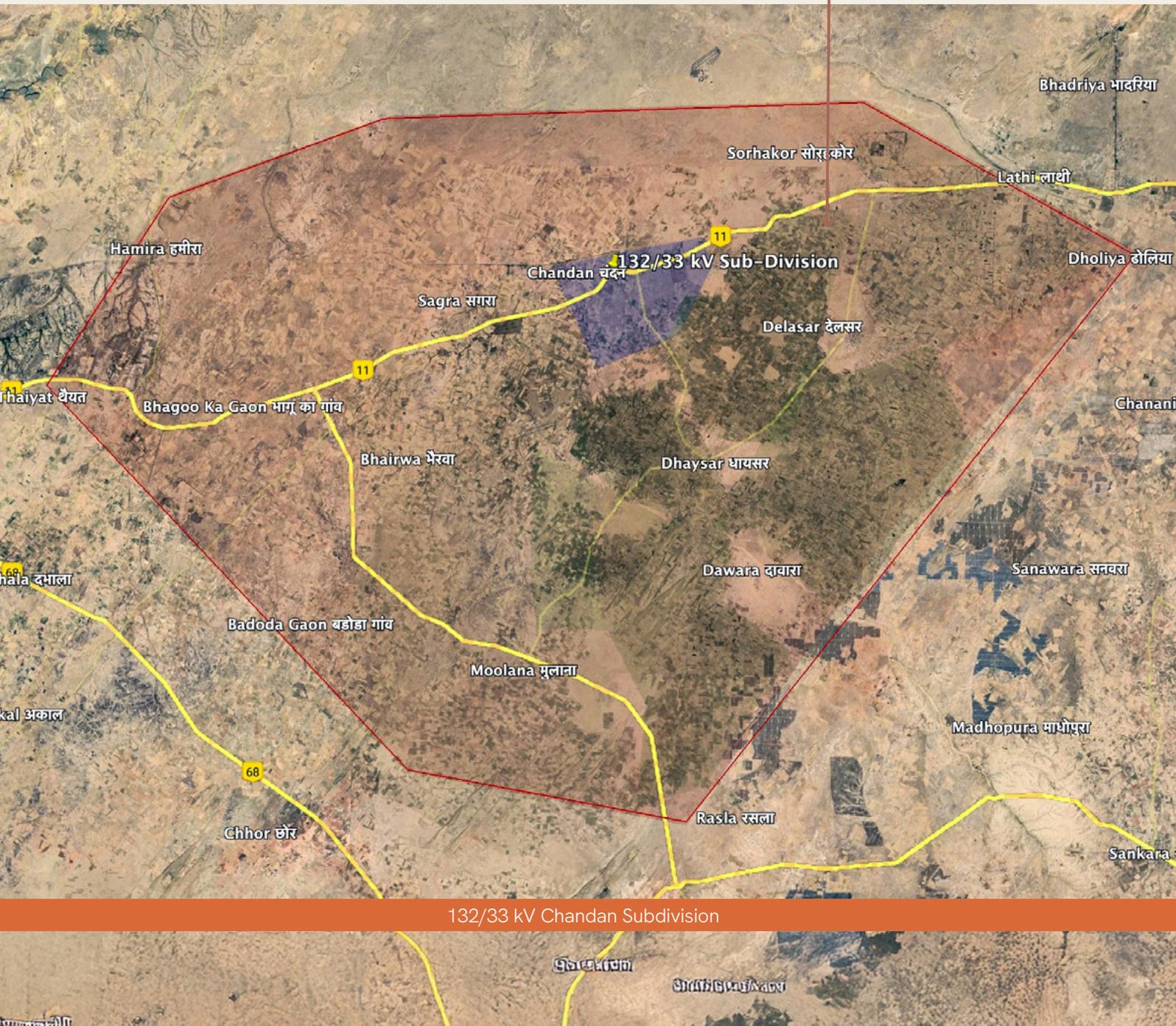
CENTRE FOR ENERGY, ENVIRONMENT & PEOPLE

Rethinking Agricultural Power Supply Solutions in Chandan Subdivision, Jaisalmer



This policy brief is based on ground research by the Centre of Energy, Environment and People, examining the challenges faced by farmers in accessing a reliable electricity supply and services within the Chandan Subdivision of Jaisalmer, Rajasthan. The research explored behavioural issues of consumers, institutional challenges, and infrastructure challenges.

The brief is intended to familiarise decision-makers with the complexity of issues. Given the constraints around building new transmission infrastructure, it also offers alternate pathways for bridging energy gaps in the region.



Introduction

Given that over 60% of Rajasthan's population depends on agriculture - contributing nearly a quarter of the state's GDP - power supply challenges can have widespread and significant consequences (DES, 2024). Unreliable electricity supply and services can disrupt livelihoods and reduce incomes due to crop failures, equipment damage, operational disruptions, and related challenges. Electricity, water, and agriculture form a nexus where actions in one system directly affect the others (Prayas (Energy Group), 2018).

Farming communities in water-scarce regions, such as western Rajasthan, that rely on electricity for groundwater irrigation are particularly vulnerable. The Chandan area in Jaisalmer district is one such region where farmers struggle with persistent electricity supply issues, exemplifying the challenges faced by farmers across Rajasthan.

Despite being in an arid zone and with no connectivity to irrigation canals, agriculture is the primary occupation in Chandan. This is feasible because of the availability of ample groundwater at approximately 200 feet depth. This implies a critical dependence on electricity supply for irrigation needs. Electricity distribution in the area is managed by Jodhpur Discom, overseeing an Operation and Maintenance (O&M) area of over 1,200 square kilometres across 15 gram panchayats, including various villages and hamlets.

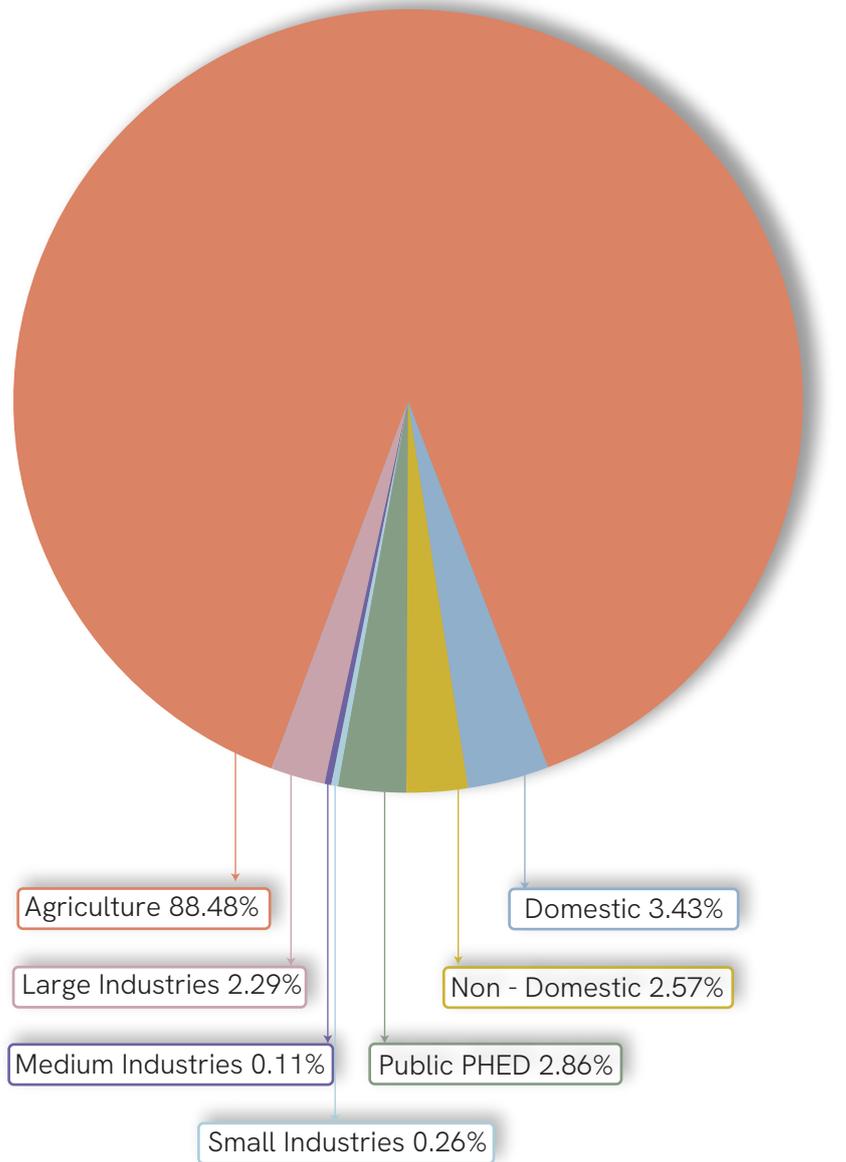


Figure 1: Category-wise Demand of Chandan Subdivision

Problem Analysis of Electricity Supply in Chandan

Farmers in the Chandan area face an unreliable and inadequate power supply, compounded by poor services that frequently disrupt farming activities. Farmers report that the block supply of electricity is limited to 4 to 4.5 hours per day only¹, instead of an assured supply for six hours. Their challenges are further exacerbated by voltage fluctuations and other supply issues that frequently damage agricultural pumps. Equipment repair and loss of irrigation time bears a significant financial loss² for the farmers in the region.

A synthesis of operational and regulatory issues is presented in this section.

Distribution Infrastructure Constraints

The 132/33 kV Chandan Substation has a capacity of 125 MVA against an estimated demand of approximately 180 MVA, indicating a major capacity gap to meet the demand (Details of the local network are provided in Annexure 1). The local distribution infrastructure, including overhead lines, transformers, and poles, is in poor condition due to inadequate and erratic maintenance. Load planning and optimisation of distribution network assets have been inadequately implemented, leading to the overloading of some feeders while others remain under-utilised. The demand on certain 11 kV feeders is reportedly two to three times higher than those within the same GSS. In certain cases, the feeder lines extend over long distances, reaching up to over 25 kilometres, resulting in increased losses and voltage fluctuations.

Operational Deficiencies and Resource Constraints in Discom

The local Discom offices and substations are severely understaffed and under-equipped³, especially when considering the number of substations and feeders, the size of the consumer base, and the wide range of responsibilities. The substations lack basic infrastructure and equipment such as personal safety equipment, ladders, and tool. For instance, the 33/11 kV Sojiyo ki Dhani GSS in the Chandan Subdivision is without boundary walls and a proper entrance gate (Image 1). In many cases, restrooms or dedicated rooms are not constructed, making it unfeasible for staff to remain on-site overnight, which hampers the ability to carry out essential operations. The workers do not have access to basic safety gear or equipment required for servicing, such as a proper wooden ladder to climb poles.

Moreover, Discom does not maintain an adequate stock of equipment needed for essential maintenance tasks, such as poles or transformers. This results in delays in restoring supply and repairing or replacing burnt or faulty equipment - such as poles, transformers, cables, and other components - along with a lack of communication regarding supply hours in the area.

Pending Connections and Illegal Tapping

The area experiences significant power demand⁴ due to agricultural connections during both the Kharif and Rabi seasons. There are currently 1,100 pending agricultural connection requests for which demand notes have been submitted, but Discom is unable to fulfil new connection requests due to capacity constraints at the grid substation and infrastructure limitations. Out of the 1,100 pending connections, Discom estimates that approximately 700-800 are connected to the existing 11 kV feeders through illegitimate means. This bypassing of the metering systems and connecting to the electrical lines without proper consent or regulation poses significant safety hazards, including the risk of electrocution, fires, and damage to infrastructure. Illegal tapping leads to revenue loss for Discoms, disrupts the stability of the power supply, and increases the financial burden on law-abiding consumers.

¹ In the past two years, farmers have received just 3-4 hours of electricity amid frequent interruptions, unscheduled outages, and low voltage (250-300V instead of the required 400-430V).

² One farmer reported his transformer burning out three times in a month, with each repair costing INR 40,000.

³ The 132/33 kV substation in the area has a 125 MVA capacity, serving nine 33 kV feeders connected to twenty-one 33/11 kV grid substations. The Chandan Subdivision employs 42 permanent staff, including engineers and linemen, along with 11 contractual workers managing two grid substations each.

⁴ The approximate 5,000 agricultural connections in the Subdivision account for over 90% of the total power demand.



Image 1: Sojjo Ki Dhani GSS located adjacent to the village approach road

Recommendations

The electricity distribution issues in Chandan stem from inefficiencies in Discom operations and systemic challenges widely acknowledged across the state. Based on the Chandan region, this section outlines targeted policy interventions and locally tailored solutions to address the challenges related to agricultural electricity supply in the state. Given the multidimensional nature of these issues, engaging with the farming community is crucial to understanding their perspectives and challenges. This engagement facilitates effective integrated planning and execution.

Improving Distribution Infrastructure and Services

The distribution infrastructure needs reinforcement through upgrades, renovations, and regular maintenance. A 220 kV GSS is recommended for the Subdivision, along with feeder segregation and a transition to a 24-hour block supply. These measures will enhance feeder management, reduce infrastructure load, and optimise peak demand handling. Smart metering for agricultural supply will further improve monitoring and load planning. Operational and maintenance services must be significantly improved to ensure regular maintenance, infrastructure upgrades, efficient billing, and timely complaint resolution. Addressing understaffing and resource shortages in Discom offices and substations is crucial to scaling the workforce, and maintaining an adequate inventory of spares, tools, and safety equipment to meet the demands of substations, feeders, and consumers.

Adoption of Decentralised Renewable Energy (DRE)

With abundant land and ample solar insolation, the state's agricultural areas are well-suited for the deployment of decentralised solar energy systems. This would reduce power purchase costs for utilities (Prayas (Energy Group), 2014), ease the financial burden of agricultural subsidies, and provide farmers with a more reliable, uninterrupted power supply, while promoting environmental sustainability, thereby creating a mutually beneficial solution for both farmers and Discoms. Feeder-level solarisation at the substation level, along with tail-end integration through solar pumps and ground-mounted solar systems, would help ease the load on utility infrastructure and address grid capacity and infrastructure constraints. It has to be noted that the success of this approach hinges on a reliable power supply and infrastructure, making it essential for Discom to enhance supply quality and network availability. Hence, integrated planning and community engagement are critical to ensure long-term success.



The Chandan region has a total estimated solar energy potential of 216 MW, with at least 66 MW available to bridge the current supply gap, spread across more than 1,800 farms.

The region also holds potential for demand-side management by leveraging energy-efficient pumps, capacitors, and optimised cables.

Oversight for Agricultural Connections

Agricultural supply is governed by the Agriculture Policy set by the state government, rather than by the regulatory framework established by the regulatory commission. In the absence of such a framework for agricultural connections and a lack of measures to ensure accountability and transparency by Discoms, poor service quality is exacerbated, leaving consumers vulnerable to exploitation. The agricultural electricity supply should be brought under the regulatory framework by establishing appropriate terms and conditions, along with performance benchmarks.

It is recommended to implement interim Standards of Performance (SoP) and Terms and Conditions of Supply (TCoS) until formal mandates are issued by the state government or the regulatory commission. Unscheduled outages and shortages can only be effectively addressed when power supply data is made publicly available. Therefore, publishing the voltage data for agricultural supply at 11 kV is recommended, along with feeder peak loads and overload durations (>90%) relative to total supply hours. Establishing platforms for communication and engagement with the farming community can play a key role in locally managing load, optimising consumption, and preventing misuse. Feeder-level GSS monitoring committees, with participation from local leaders and representatives, can enhance local oversight and facilitate information exchange and stakeholder engagement. The formation of similar committees at the circle-level and state-level monitoring committees will improve oversight and drive better performance.

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Annexure - 1

Network Diagram of Chandan Subdivision

