सत्यमेव जयते
Education Department
Government of Gujarat

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Energy & Petrochemicals Department
Government of Gujarat

Open Innovation Challenge 2022 Energy Sector

i-Hub
(A Gujarat Government Enterprise)

GUVNL

SSIP

FOREWORD

India has set ambitious targets for its power sector, by aiming for a continuous power supply for all, with a major share from renewable energy by 2030. Today, as almost every citizen has access to grid electricity, power deficiency has decreased sharply. The installed renewable energy capacity has reached a substantial level of the total capacity. However, in the power sector, the distribution of energy is still a challenging link which creates consequential churn and disruption. These challenges in the power sector create opportunities for new and innovative business models.

The Gujarat Urja Vikas Nigam Limited (GUVNL) is the parent company of all state power utility companies. GUVNL is involved in the bulk purchase and sale of electricity, as well as the supervision, coordination, and facilitation of the activities through its six subsidiary companies. Currently, the industry is facing operational challenges in the existing technologies in power distribution which makes it crucial to innovate and implement new solutions.

It is of prime importance to realize the potential and capabilities of young innovative minds to solve the existing problems that could bring the best solutions and opportunities to the energy industries. On that note, GUVNL and i-Hub are jointly developing a holistic ecosystem for startups in the energy and allied domains. The "Energy Open Innovation Challenge 2022" is one such effort towards this objective. GUVNL has compiled and provided on-ground problem statements for the students, startups and innovators to work upon with their creative ideas/solutions. Shortlisted solutions will be awarded with ideation grant of up to INR 2.5L by i-Hub. These support mechanisms provision more youth to engage in real-life industrial challenges and bring their creative pursuit to life for the betterment of the society at large.

These interventions will help in building a cohesive and strong ecosystem for startups in the energy and allied domains in the state of Gujarat. I am confident that these young innovators will defeat the age barrier by innovating solutions at par with industrial standards and will yield pragmatic outcomes for the energy sector. Each of them will put their innovative skills and assiduous effort into doing their best to create a positive impact in the state.

Shri Jai Prakash Shivahare, IAS
Managing Director,
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Open Innovation Challenge 2022 - Energy Sector

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Challenge ID:	PS 001
Segment:	Transmission Lines & Substations
Challenge Title:	Health Monitoring of String Insulators
Challenge Description:	When an insulator fails in a line or substation, the power system component disconnects from the grid. Particularly when the system is running in critical conditions, it causes a significant blackout. The condition of the insulator(s) and its likelihood of failure cannot be predicted in advance. Therefore, it is impossible to prevent such unplanned interruptions.
Exact Problem to be Solved:	To operate and maintain electricity systems with safety, efficiency, and consistency.
Target Users:	Transmission Utilities
Expected Outcomes:	An online insulator monitoring tool that warns the utility before an insulator fails or flashes over and continuously reports the health condition of insulators.
Potential Impacts:	• Get enough time to operate the grid while anticipating and taking into account the failure of that specific component. • Plan ahead to replace or maintain a failing insulator. • Reduce the amount of time it takes to locate and maintain faults by locating the location and even specific insulators in a string.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 002
Segment:	Transmission Lines & Substations
Challenge Title:	Mechanical Strength / Health Measurement / Monitoring of String Insulators
Challenge Description:	Every time an insulator string needs to be maintained or replaced, whether it be for a line or substation, a maintenance team must go to the insulator string. There have been instances of insulator mechanical failure during such maintenance that have resulted in tragic or non-fatal incidents in the past.
Exact Problem to be Solved:	Before performing any repairs, should examine the string insulators' mechanical condition.
Target Users:	Transmission Utilities
Expected Outcomes:	Device for measuring mechanical health and strength and providing information on the mechanical integrity of insulators in order to prevent undesirable events (the device shall be used on-site and shall not interrupt power supply through line).
Potential Impacts:	Safety of Maintenance Crew

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Challenge ID:	PS 003
Segment:	Transmission Lines
Challenge Title:	Enhancing Transmission Line Surge Impedance Loading
Challenge Description:	Utilities must transmit an increasing amount of power through the few transmission lines that are currently in use due to the growing demand, but in order to keep the lines stable, they must not be run above their surge impedance loading. As a result, more lines must be installed. Due to growing RoW difficulties, it is challenging to connect additional lines to the transmission line network because it is currently so extensive.
Exact Problem to be Solved:	The conductor and tower configuration and design ultimately determine the surge impedance loading of the transmission line, thus R&D is necessary to obtain new conductor & tower configuration & design at competitive prices and thereby raise the surge impedance loading of transmission line (the solution shall be given for 100 km line length).
Target Users:	Transmission Utilities
Expected Outcomes:	Innovative conductor and tower configuration/design to transmit more power down a smaller transmission line corridor or can build a tool to aid in increasing the line's ampacity.
Potential Impacts:	Optimal use of the current transmission line corridor

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 004
Segment:	Transmission Lines
Challenge Title:	Vegetation Management in Line RoW using ICT & GIS Technology
Challenge Description:	Power lines trip due to vegetation. Only by personally patrolling the line can the line maintenance crew monitor the growth of vegetation in the line RoW. As a result, it is occasionally but not consistently monitored. This causes line tripping occasionally because of vegetation.
Exact Problem to be Solved:	Utilizing a Geographic Information System (GIS) and Information & Communication Technologies (ICT), the vegetation must be continuously monitored in order to provide utilities with notifications.
Target Users:	Transmission Utilities
Expected Outcomes:	Planned control of the vegetation. It is anticipated that a system will be created that can really track the distance between a line and the ground or in a similar manner, and, preferably, locate the location point with an alarm, in the event that the distance decreases down below a certain level.
Potential Impacts:	Pre-planning the maintenance.

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Challenge ID:	PS 005
Segment:	Power System Protection
Challenge Title:	Fault Location (Tower No.) Signification by the Relay and Type of Fault by Interpreting DR
Challenge Description:	The current numerical relays provide fault sites as distances, rather than their precise locations, such as Tower No. Additionally, the relays provide a Disturbance Recording capability (DR). It displays the voltage and current waveforms. One cannot determine the sort of fault—insulator flashover or failure, conductor cracking, fault brought on by vegetation, etc.—with this information.
Exact Problem to be Solved:	The numerical relay feature will be improved to provide precise position information, such as Tower No. Additionally, the Disturbance Recording (DR) feature of the relay needs research in order to analyse the waveform patterns and other DR parameters automatically and let the relay identify the fault kind.
Target Users:	Transmission Utilities
Expected Outcomes:	Determine the exact position and type of fault on the line to aid in making a test trial choice. The location is now estimated to be between 4-5 km long, however it is anticipated that this distance will be decreased further by suggesting a workable technique using data from a distance recorder and the current relaying system.
Potential Impacts:	The outage time can be decreased by planning the maintenance tasks according to the fault type.

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Challenge ID:	PS 006
Segment:	Safety
Challenge Title:	Devices directly Connected to the Power System Elements to Signify that It is Live
Challenge Description:	Before beginning any maintenance work, it is usually necessary to determine whether the power system component is active (charged) or dead (discharged). Accidents can happen when it isn't done for one reason or another.
Exact Problem to be Solved:	If the power element itself can determine whether it is alive, that will be preferable. To do this, certain sensors or other devices that can be linked to a power system component and communicate with maintenance personnel about its state must be developed.
Target Users:	Electrical Maintenance Crew
Expected Outcomes:	A cutting-edge safety gadget. A gadget that can detect potential at a site like a pole, transformer, LA, or any comparable one, is anticipated to be developed. The safety personnel will be alerted that the gadget or equipment is live by sensing the potential, even if it is unplugged from the network.
Potential Impacts:	Averting Accidents - Enhanced Safety

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Challenge ID:	PS 007
Segment:	Earthing
Challenge Title:	Intelligent Monitoring System for Earthing
Challenge Description:	There is no monitoring mechanism for earthing, which is a significant but complicated topic. Poor earthing puts the safety of utility workers and members of the public at risk while also causing several issues for electrical system installations and equipment, such as malfunctioning or non-operation of protection relays.
Exact Problem to be Solved:	Poor earthing must be immediately identified and earthing must be checked.
Target Users:	Power Utilities
Expected Outcomes:	An intelligent earthing monitoring system that provides information on the earthing's condition. A system or device that can continually monitor ground resistance is anticipated. In addition, it should be able to identify and alert staff members if there is an open circuit (Floating Neutral) in the earthing system. The system/device must be used initially with equipment like generators, transformers, lightning arrestors, and others of a like nature.
Potential Impacts:	The overall safety of people, equipment, and the electrical system.

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Challenge ID:	PS 008
Segment:	Operation & Maintenance
Challenge Title:	Big Data Analytics
Challenge Description:	The utilities are manually collecting and analysing a large amount of data in discrete manner. Because it requires human interaction, the procedure takes a long time and is prone to mistakes.
Exact Problem to be Solved:	By "Data Analytics," which acts on the insights and examines the findings to aid in decision-making to maximize the productivity of assets and to improve operations with the least amount of expense, the data shall be automatically merged and evaluated with situational context. • Reactive power study. • Load growth, weather forecast (for detailed information see challenge ID PS-012, PS-023 & PS-025). • Maintenance load cycle.
Target Users:	Power Utilities
Expected Outcomes:	Data Analytics for, • Grid operation • Asset Management - Real-Time Predictive Analytics
Potential Impacts:	• Efficient grid operation. • Improved availability, reliability & safety of assets. • Reduced operational cost.

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Challenge ID:	PS 009
Segment:	Substation
Challenge Title:	Humidity Controller / Dehumidifier for Panels / Cubicles
Challenge Description:	Electrical parts and equipment can sustain significant damage from humidity and the ensuing condensation. In substations where the humidity level is high, such as coastal area substations, space heaters with thermostats are used, but they are not very efficient.utilized
Exact Problem to be Solved:	To avoid condensation, especially in Medium Voltage (MV) Switchgear Panels, by keeping an eye on the humidity level and maintaining the enclosure's interior air content.
Target Users:	Transmission & Distribution Utilities
Expected Outcomes:	Thermoelectric dehumidifier and vent drain for MV switchgear panels and marshaling kiosks are solutions for removing moisture from the air.
Potential Impacts:	• Continue to dry the panel's interior air and remove moisture from it. • Control condensation on components and panel walls. • Prevents condensation and humidity-related component problems and failures. • Prevents Corrosion / rusting of electrical components.

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Challenge ID:	PS 010
Segment:	Distribution Lines / Safety
Challenge Title:	High Impedance Fault Protection for 11kV / 22kV Feeders
Challenge Description:	The overhead lines that make up the majority of the 11/22 kV distribution feeders are liable to fail. Typically, Earth Fault Protection Relays and traditional Over Current Protection Relays are used to detect and clear these faults. It occasionally occurs that an 11/22 kV feeder conductor makes unintentional electrical contact with a road surface, sidewalk, sod, tree limb, or with another poorly conductive surface or object. As a result, the flow of fault current is constrained to a very low value, even well below the load current, due to the high impedance path provided by these objects. As a result, conventional/traditional Over Current & Earth Fault Protection Relays struggle to distinguish between and consistently detect these "High Impedance Faults" (HIF). The downed or damaged conductor on the load side also contributes to a very low fault current. When there is load shedding, the situation in the AGDOM feeder deteriorates even worse. In such situations, the conductor may occasionally stay energized, and if it is within reach of people or animals, or property, it poses a major risk and may result in non-fatal or even fatal accidents.
Exact Problem to be Solved:	While HIF detection has been a subject of research and development for many years, utilities currently lack a trustworthy and commercially viable solution or product. It is anticipated that the system/device would be able to accurately identify the open conductor problem.
Target Users:	Transmission & Distribution Utilities
Expected Outcomes:	Several trustworthy & affordable methods for locating High Impedance Faults in Distribution Feeders.
Potential Impacts:	• Tripping of Distribution Feeders on HIF • Safety

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Challenge ID:	PS 011
Segment:	Transmission / Distribution Line and Safety
Challenge Title:	Preventing Test Charge of the Line/Feeder during a Fault
Challenge Description:	The transmission system consists of substations and transmission lines/feeders with a voltage class ranging from 66 to 400 kV. MV systems, or 11 to 33 kV, often fall under the category of distribution systems. When a line or feeder trips, the utility substation operation personnel typically give it one try before charging (turning ON) the line or feeder. Due to this, it occasionally occurs that the line/feeder gets charged (turned ON) on fault, which means the fault was present at the time the line/feeder was switched ON. The aforementioned line/feeder, transformers, and substation equipment as a whole experience shock and stress as a result of these tests. Additionally, accidents might happen occasionally, especially on distribution feeders.
Exact Problem to be Solved:	To avoid charging the lines or feeder when there is a failure.
Target Users:	Transmission & Distribution Utilities
Expected Outcomes:	The line/feeder is checked for healthiness, i.e., to ensure there are no faults on the line/feeder, and to avoid switching on the line/feeder when there are faults on it, using a solution or device that can be attached to the line or installed in the control panel.
Potential Impacts:	• Prevents more damage to the line/feeder. • Avoids stress on Transformers and other equipment of the substation.

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Challenge ID:	PS 012
Segment:	Power System Planning
Challenge Title:	Inadequate Information regarding Load Growth and Time Frame
Challenge Description:	• Due to a lack of precise load increase information, there are some areas where the network is constrained. • Planning is primarily based on historical data and operational input in the lack of pocket-level data on demand increases. • This could lead to underutilization at some locations and an insufficient network in some areas. • Difficulties in obtaining scheduled or forced outages. • All interested parties, including government agencies, local governments, GIDC, industrial groups, etc., should adopt a scientific and coordinated approach.
Exact Problem to be Solved:	DISCOMs are required to disclose the predicted demand growth in terms of cost, as well as the timing and kind of load.
Target Users:	Distribution Companies and Consumers
Expected Outcomes:	Optimum planning and utilization of the transmission network.
Potential Impacts:	Optimal network planning and adequate network availability lead to efficient resource use.

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Challenge ID:	PS 013
Segment:	Connectivity of RE Plant and Consumer with Grid
Challenge Title:	Capacity limitation of Substation, Transformer, and Transmission Lines in Urban/Underdeveloped Areas
Challenge Description:	Most places lack the capacity of substations, transformers, and transmission lines, making it impossible to link new producing plants and consumers there. This is having a huge impact on the state's urbanisation.
Exact Problem to be Solved:	The expansion of the current substation, transformer, and transmission line capacity with the least amount of construction.
Target Users:	State Transmission Grid Users
Expected Outcomes:	Technology or innovation that is reasonably priced and increases the capacity of a substation, transformer, or transmission line with the least amount of additional effort.
Potential Impacts:	Utilities can be, • Connect the customer and the generator at their potential or practical locations. • Entice more consumers and producers to the state. • Accelerate the state's urbanization process.

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Challenge ID:	PS 014
Segment:	Power System Operation - Reactive Power Compensation
Challenge Title:	FACTs Devices MV Distribution Level - Technologies to Bring Down the Cost
Challenge Description:	Flexible AC Transmission System (FACTS) devices, which are more commonly used for EHV Transmission systems and are more expensive, are available on the market as dynamic VAR compensators. Actually, at the MV distribution level, VAR compensators are heavily needed. But it isn't being used because of its expensive price.
Exact Problem to be Solved:	To provide solutions with comparatively lower costs, R&D is required in dynamic VAR compensators, such as STATCOM (Static Synchronous Compensator) at the MV distribution level.
Target Users:	Transmission & Distribution Utilities
Expected Outcomes:	Dynamic VAR compensators at affordable cost.
Potential Impacts:	• The optimal place for dynamic reactive power correction is at the load level. • Better quality power to consumers.

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Challenge ID:	PS 015
Segment:	Operation & Maintenance
Challenge Title:	Robotics for Operation & Maintenance (O&M) in Power Utilities
Challenge Description:	Although robots have long been employed in industry, they have not yet been implemented in the operation and maintenance of the power system, despite the fact that dealing with electricity is always dangerous for humans. Automation has undoubtedly been beneficial, but there are still many O&M applications for robotics.
Exact Problem to be Solved:	To operate and maintain power systems in a manner that is consistent with safety, efficiency, and reliability.
Target Users:	Power Utilities
Expected Outcomes:	Robots for O&M - Lessening of human involvement Basic requirements for a robot in a substation includes recording equipment metrics such as surface temperature, vibrations, leakage current, etc.
Potential Impacts:	Safe, Efficient & Consistent O&M Work

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Challenge ID:	PS 016
Segment:	Operation & Maintenance
Challenge Title:	FRP Pole without Pin Insulator and Any Hardware
Challenge Description:	Transmission and distribution lines need a supporting structure in order to function. The poles, cross arms, guying, channels, wires, etc. make form the supporting framework. The supporting structure needs to be strong enough mechanically to support the weight of the lines. It's crucial to choose the right materials while making poles, their accessories, and towers. Material should be durable, non-toxic, and have a high tensile strength. Wood, steel, and concrete have been the traditional materials for the past seven decades. Due to a few advantages it has over conventional materials, Fiber Reinforced Polymer (FRP) has grown in popularity over the past several years.
Exact Problem to be Solved:	FRP systems are becoming a more popular substitute for steel or concrete structures. According to different case studies, the mechanical, electrical, and material qualities of the FRP pole and its accessories make them very promising. According to the LCA testing, steel, concrete, and FRP are all equally good performers under ideal conditions, but when we take into account the impact on the environment and resource efficiency, FRP outperforms both. When considering the cost of a support structure, it is rare that it will be cost-effective unless wise decisions are made using whole-life costing, accounting for all repair costs, including delay costs and loss of use, and using a reasonable discount rate to calculate the present value of the future benefits.

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Target Users:	Power Utilities
Expected Outcomes:	Fabrication and Design, Electrical Conductivity, Thermal Properties, Weight, Corrosion, Stiffness Resilience
Potential Impacts:	The safety of new line/maintenance activities workers has improved.

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Challenge ID:	PS 017
Segment:	Safety
Challenge Title:	Adjustable and Flexible Ladder Usable for 2 Wheelers
Challenge Description:	The majority of the utility staff members labor without a ladder or other support. 8 meters is the bare minimum pole height. As a result, they must ascend the pole alone. so some employees refrain from climbing the pole (maybe some age factor, Health issue, or new employee). Accident probabilities are also higher. Additionally, some locations are inaccessible by ladder vehicles.
Exact Problem to be Solved:	Creation of adaptable, mobile, and cost-effective solutions for field personnel.
Target Users:	Line Staff of Power Utilities
Expected Outcomes:	• The safety of line staff is increased. • Accident reduced. Work speed is increased.
Potential Impacts:	Utilities for the convenience of the new line/maintenance crew.

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Challenge ID:	PS 018
Segment:	Operation & Maintenance
Challenge Title:	New PSC Pole Design
Challenge Description:	Transmission and distribution lines need a supporting structure to be supported. The poles cross arms, guying, channels, wires, etc. make form the supporting framework. The supporting structure must be strong enough mechanically to support the weight of the lines. It's crucial to choose the right material while making poles, accessories, and towers. The material should be durable, non-toxic, and have high tensile strength. Concrete, steel, and wood are the traditional materials still in use today. The Established PSC pole has a problem with the number of people standing there. Additionally, the mechanical strength of the pole is a level 2 problem. It is also necessary to take into account in the design the diverse fabrication materials offered at the poles. Additionally, some of the poles break during shipping.
Exact Problem to be Solved:	Line employees find it simple to use. It will be possible to perform standard fabrication material installation activities.
Target Users:	Power Utilities
Expected Outcomes:	• Safety of manpower refers to the ability of maintenance staff to operate comfortably and safely on an arm or other similar structure by climbing upward. Equipment handling and maintenance should be made simpler without compromising safety. • Reduce Accident • Easy to installation. • Damage of pole ratio reduce.
Potential Impacts:	For various new line/maintenance activities, utility performance improves while maintaining safety.

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Challenge ID:	PS 019
Segment:	AT & C
Challenge Title:	Battery Operated String Conductor Device
Challenge Description:	The conductor's sag is a key factor in the construction of electrical lines. A conductor's improper stringing increases the likelihood of errors. Additionally, occasionally inadequate manpower is available during maintenance activities, resulting in improper conductor stringing.
Exact Problem to be Solved:	It is possible to string conductors properly with less effort.
Target Users:	Power Utilities and Its Contractor
Expected Outcomes:	Quality work with line staff safety.
Potential Impacts:	Benefit to DISCOM.

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Challenge ID:	PS 020
Segment:	AT & C
Challenge Title:	The Routine Practice of Attending Faults of the Agricultural Feeder
Challenge Description:	Line staff visit Ag feeders whenever any sustained problems arise by physically disconnecting each AB switch in order to locate the problem.
Exact Problem to be Solved:	Sometimes problematic sections can be located at the end by trial and error approaches by isolating each AB switch one at a time, which takes time and results in feeder tangling and customer complaints.
Target Users:	Consumers of Rural and Agriculture Sector
Expected Outcomes:	In order to quickly detect the defective piece of a radial feeder and fix the feeder problem, a cost-effective solution is needed.
Potential Impacts:	Reduce customer complaints as the amount of time spent looking for fault decreases.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 021
Segment:	Renewable Solar Energy Operation Cost
Challenge Title:	Dust Proof Coating / Glass on Solar Panel
Challenge Description:	Gujarat is a state rich in SPVs. Gujarat has the most SRTPV system installations completed of any state in India. Solar production is pretty large, but numerous soiling elements also have a negative impact on it. The SPV generation is impacted by soiling loss from dust, birds muck, etc. Millions of units were generally lost as a result of this. Millions of units might be saved in a country if a cost-effective way to prevent loss due to soiling could be discovered.
Exact Problem to be Solved:	Improved efficiency of SPV system.
Target Users:	Consumers of DISCOMs and many other stake holders.
Expected Outcomes:	• New dust proof materials. • Improve solar generation. • Technique/system/device to clean-up surface of Solar Panels.
Potential Impacts:	Benefits for both consumers and the entire power system.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 022
Segment:	Material
Challenge Title:	Recycling of Scrap / Unserviceable SMC Materials / FRP Materials
Challenge Description:	Due to the fact that plastic trash is not biodegradable and persists on Earth for a long time, its disposal is a big environmental concern when it comes to products manufactured of thermosetting materials like FRP (Fiber Reinforced Plastic) and SMC (Sheet Molding Compound). Since SMC/FRP materials have many advantages over steel materials, including low weight, good chemical properties, and corrosion resistance, they are currently used in a variety of products, including metre boxes, distribution boxes, energy metre bodies, and fabrication items like v-cross arms, straight cross arms, and top clamps. Since these goods have been in use by PGVCL for the past ten years and a sizeable part of them break down or are scrapped each year, disposing of them has become a substantial problem. The amount of material that is scraped and bought each year, together with the unit cost, is available separately. It is imperative to have alternatives, such as the reuse or recycling of SMC/FRP materials used in various items that are declared scrap or unusable, as the central pollution control board has established disposal norms for thermosetting materials like FRP/SMC that must be strictly adhered to in order to reduce the environmental impact of improper disposal.
Exact Problem to be Solved:	The SMC/FRP material molding method involves a very specialized production process, making it difficult, if not impossible, to fully recover an original compound through recycling. The feasibility of recycling SMC/FRP material should be investigated in order to create smaller parts or equipment that can be used, thereby utilizing scrap material, especially in light of the quantity of scrap material produced at PGVCL and the similar usage of SMC/FRP material-based items/parts in other construction projects, automobiles, and related industries.

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Target Users:	Allied Industries and Construction Manufacturers
Expected Outcomes:	SMC and FRP material recycling can be planned well to save money and have a smaller negative impact on the environment.
Potential Impacts:	Benefit to DISCOM.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 023
Segment:	Data Analysis
Challenge Title:	Data Analysis to Identify Unsuitable Consumer Behaviors and Produce Alerts as Necessary
Challenge Description:	Maintaining watchfulness on consumption patterns and guaranteeing adequate energy recording is a very difficult chore with PGVCL's user base of more than 60 lacs. In order to take action on limits, an exception report based on data analysis and trends from energy usage, bill payment, and meter status needs to be prepared. Due to unlawful consumption, rising demand, faulty meters, etc., consumers. Data analysis is necessary to find timely alerts for in-the-moment intervention, particularly in the case of unlawful power consumption and power consumption in accordance with contract demand, as well as to locate the repetitive lock, defective, zero, and defaulter users.
Exact Problem to be Solved:	The precise issue is to pinpoint instances of unlicensed power use, theft of electricity, including meter bypassing and meter tempering, consumers who don't pay bills on time, and excessive and low consumption in comparison to contracting requirements. Real-time action is also necessary to stop power theft and disconnections due to unpaid electricity bills. System-generated notifications are necessary for it.
Target Users:	Consumers use power carelessly and delay making payments on their bills.
Expected Outcomes:	Consumers who are not using the authority to punish themselves and who are not paying their bills on time will be identified through data analysis, and real-time warnings may be set up. This information will be available, and it will be very helpful for the task force to take further action.
Potential Impacts:	The task force might be able to work with the right goal within the allotted time thanks to the availability of accurate information with alerts, which would result in a decrease in AT & C losses as well as in arrears.

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Challenge ID:	PS 024
Segment:	Safety Equipment
Challenge Title:	Instantaneous Current Detection of the Overhead Line while Working
Challenge Description:	The largest DISCOM in Gujarat is PGVCL. It supplies power throughout a region of Saurashtra and Kutch that is 1 lac square kilometers in size. possessing a distribution network with more than 250 subdivisions, more than 2 lac km of HT line, 1 lac km of LT line, and more than 10 lac distribution transformer. More than 4000 line workers are on duty 24 hours a day to provide a steady supply of electricity to consumers. To complete a variety of duties, overhead distribution wires must be used. Instantaneous current detection technology must be made available in order to protect line employees from electrical hazards caused by unintentional contact with power in the distribution line while they are working.
Exact Problem to be Solved:	Currently, sorting or earthing the line is the only way to ensure that the line current is correct before the line staff enters the network. If the line staff accidentally skips sorting or earthing the line, safety equipment such remotely high voltage detection of current is required.
Target Users:	Line Staff
Expected Outcomes:	If line staff earths and sorts the line incorrectly, this remotely monitored current detector will notify line crew so they can fix the problem.
Potential Impacts:	It reduces the staff/ lineman's accident.

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Challenge ID:	PS 025
Segment:	Load Forecasting
Challenge Title:	Precise Load Forecasting Considering Dynamic Weather Patterns
Challenge Description:	Due to the fact that electricity has become an integral component of daily life, it is crucial for distribution utilities to effectively manage supply and demand on a daily basis with continuously changing environments. Numerous other variables, including humidity, particularly in warm and humid climates, precipitation, thunderstorms, wind speed, and light intensity of the day, have an impact on load/demand predictions as well. By foreseeing future electricity demand by different industries, load forecasting reduces utility risk. Predictive modelling for renewable generating, demand response/load analysis, and the weather are examples of techniques. GETCO manages the energy interface, where PGVCL has embraced the practice of previous historical consumption available injection points. Forecasting is done using hourly load data, monthly load data, and annual load data related to holidays, staggered days, and seasons. Data on the weather and wind conditions have also been used on the website. However, a precise load forecast cannot be made because the distribution company lacks access to accurate and timely weather data across the jurisdiction's various regions, which span a 1 lac km2 area. This is because the weather within PGVCL's jurisdiction varies significantly from one region to another.
Exact Problem to be Solved:	By taking into account a matrix of the current and previous seasons, weather, wind, and other elements, precise load forecasting is not done algorithmically or scientifically. Additionally, human participation is the only factor in the current load forecasting procedure. instead of employing modern systematic techniques and Artificial Intelligence (AI).
Target Users:	The state load dispatch center, the directly-load management unit, and the indirectly-area load dispatch center.

Expected Outcomes:	Limiting DSM fees and maintaining production in accordance with system demand generation that is picked up and set down properly and in accordance with system needs. maintain grid protocol with ease.
Potential Impacts:	To avoid unwanted load shedding.

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Challenge ID:	PS 026
Segment:	Equipment Condition Monitoring
Challenge Title:	High Vibration in the Steam Turbine of the Thermal Power Plants
Challenge Description:	Since the shaft is off-center in its bearing and there is not enough space between the stationary and rotating sections, there is vibration. Even if the clearance just changes slightly, there could still be enough rubbing along the rotor to harm it. Many of the causes, such as Unbalancing of Steam Turbine Rotor, led to vibrations in a steam turbine. • Wearing of Rotating Element. • Deposition on Blades of the Steam Turbine Rotor. • Damage of Journal Bearing. • Differential Expansion and Rotor Expansion. • Actuator Fluctuations. • Improper Lubrication. • Misalignments with shafting. • Disturbance in bearing Clearances. • Looseness of support bearings. • The natural frequency of shafting etc. When a unit is operating for a longer period of time and then must be stopped, it is typically noticed in GSECL that the Turbine axial shift changes positively. Additionally, a surge in turbine shaft vibration has been noted.
Exact Problem to be Solved:	It is fundamental to have minimal vibrations for the TG set to have a long, reliable life. There needs to be research done to determine the cause of the excessive vibration, and equipment or technology needs to be developed so that the turbine can function smoothly with less absolute vibration.

Open Innovation Challenge 2022 - Energy Sector

Target Users:	Operation Department
Expected Outcomes:	Time during a force outage can be reduced. Reduced unit outages, safe and reliable turbine operating, and improved overall performance.
Potential Impacts:	Gain for the company's financial and customer gain.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 027
Segment:	Equipment Condition Monitoring
Challenge Title:	Clinker Formation in the Boiler due to Change in Coal Quality
Challenge Description:	Due to changes in coal quality, clinker development in boilers is a problem in many plants.
Exact Problem to be Solved:	It is important to determine what kind of coal causes clinker formation in boilers. It is reasonable to anticipate changes in coal quality relative to design coal quality. A method needs to be created for quick and simple coal analysis. To decide operational parameters, such as %, a technique or model must be created. For altered coal quality, consider air setting, WB operation in a specific area, mill operation, etc.
Target Users:	Operation Department
Expected Outcomes:	Reduction in unit outages, and safe and dependable boiler operation, which led to an improvement in overall performance.
Potential Impacts:	Gain for the company's financial and customer gain.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 028
Segment:	Equipment Condition Monitoring
Challenge Title:	Waste Heat Recovery from Thermal Plant
Challenge Description:	Although flue gas heat is recovered in the second pass of the boiler in the thermal power plant. The flue gas has plenty of energy that is still available for future heat recovery even after the heat has been recovered. Additionally, steam drains are employed in thermal power plants to enhance the steam quality both before and after unit startup. There is also the possibility of recovering waste heat from the drains. There is a lot of room for heat recovery in thermal power plants in addition to what has already been mentioned.
Exact Problem to be Solved:	Heat recovery from the waste heat led to a decrease in heat rate, an increase in plant efficiency, and a reduction in the need for fossil fuels.
Target Users:	Operation Department
Expected Outcomes:	Increasing plant productivity and lowering the need for fossil fuels.
Potential Impacts:	Reduction in variable cost of the units.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 029
Segment:	Equipment Condition Monitoring
Challenge Title:	In ESP / Ash Plant Frequent Hoppers Choke-up Problem
Challenge Description:	Fly ash is gradually pulled into ESP hoppers during ESP operation from collection plates of ESP fields. Thermal power facilities offer pyramid-shaped hoops below their ESP fields. Hopper choke-ups occurred often during ash evacuation in wet or dry mode.
Exact Problem to be Solved:	• The system for supplying a separate fly ash silo was examined. • Technology is being developed for the increased evacuation of dry fly ash from ESP hoppers and for the monitoring of the ash.
Target Users:	Ash Plant
Expected Outcomes:	Ash evacuation cycle time and auxiliary power consumption are also reduced overall.
Potential Impacts:	Plant productivity increased. The gathering of more fly ash can be used to boost the generating company's revenue.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 030
Segment:	Operation Cost and Maintenance
Challenge Title:	Structures Exposed to the Saline Atmosphere Corrosion at a High Rate
Challenge Description:	Sea water is used as cooling water in some generating stations. As a result of the cooling tower's high conductivity/high chloride sea water vapors, the nearby structure became severely damaged.
Exact Problem to be Solved:	The pace of corrosion in the saline environment will be slowed down by the development of chemical treatment methods. in order to prevent deterioration of the nearby structure brought on by cooling tower gases.
Target Users:	Thermal Power Plant
Expected Outcomes:	Reduce the pace of corrosion, which required periodic maintenance. Enhance the structure's lifespan as well. In addition, it enhances human and equipment safety by preventing inadvertent structural damage.
Potential Impacts:	Improve the life of the structure.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 031
Segment:	Operation Cost and Maintenance
Challenge Title:	Larger Size of Lignite Coals in Lignite based TPS
Challenge Description:	The following factors, in one way or another, cause large amounts of lignite to abruptly enter the lignite boiler. • Non availability of Screen house • Non Strengthening of flite links • Spiess valve of FBHE not working Large lignite ash coolers and FBHE made charging difficult. Additionally, load variation owing to frequent feeder failures results in FBHE discharge because the operational parameters are not supported.
Exact Problem to be Solved:	A suitable screen house needs to be installed to regulate the size of the lignite inputs, or the screen house needs to be modified. To prevent the breakdown, a mechanism for strengthening the flite linkages at a specific moment or in response to wear and strain must be created. system of monitoring to detect the Spiess valve of FBHEs should be operated smoothly.
Target Users:	A lignite-based power plant with FBHEs and the usage of feeders of the "flite links" kind.
Expected Outcomes:	Sustainable power generation and PAF improvement.
Potential Impacts:	Gain for the business financially and customer gain.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 032
Segment:	Operation Cost and Maintenance
Challenge Title:	Load Restrictions on a Gas-Based Power Station's Steam Turbine
Challenge Description:	The CCPP Gas Plants owned by GSECL are situated at the Dhuvaran and Utran Stations. Even if all the conditions and parameters are favorable for the gas turbine of the CCPP, it is discovered that the turbine is not producing the rated MW.
Exact Problem to be Solved:	Scaling inside the tube, according to OEM, is one of the causes. It is necessary to create a way to locate the scaling inside the tube and remove it.
Target Users:	Gas Turbine & Generator Operators
Expected Outcomes:	Plant must be run at full capacity while significantly reducing maintenance costs.
Potential Impacts:	Gain for the business financially and customer gain.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 033
Segment:	Condition Monitoring
Challenge Title:	High Temperature of a Cooling Water Inlet/System in the Thermal Power Plant
Challenge Description:	All working/operating characteristics, including oil temperatures, bearing temperatures, and the plant's overall performance metrics, will worsen if cooling water temperatures remain higher than intended. It could lead to ineffectiveness, unintended system damage or trappings that could cause a loss of generation, as well as low efficiency. The oil characteristics of viscosity/density, for example, worsen, Babbit metal temperatures of TG bearings rise, potentially weakening bonding with parent metals, and the vacuum of the condenser cannot be improved due to high cooling water temperatures.
Exact Problem to be Solved:	It is necessary to determine the causes of the system's high cooling water temperatures and to devise methods for lowering them up to the plant's design.
Target Users:	Thermal Power Plant
Expected Outcomes:	The temperature of the cooling water should not exceed the specified value.
Potential Impacts:	Gain for the business financially and customer gain.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 034
Segment:	Operation Cost and Maintenance
Challenge Title:	Railway Yard Shunting for the Fuel Section During Loaded Wagon Pulling and Empty Formation
Challenge Description:	The loading and unloading of coal waggons takes place in the railway yard at GSECL's coal-based thermal power reactors. According to the siding configuration, handling more than three rakes at once required longer shunting times. Rake unloading also has an impact.
Exact Problem to be Solved:	It is necessary to assess the track layout and design a standard layout plan in order to shorten the time required to shunt loaded and empty formations.
Target Users:	GSECL UKAI TPS (Fuel Section)
Expected Outcomes:	Detention time was reduced, and coal demurrage was minimized.
Potential Impacts:	Gain for the business financially and customer gain.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 035
Segment:	AT & C
Challenge Title:	Electricity Theft is a Dragging Factor for DISCOM due to a Huge Financial Losses are mainly on the JGY Feeders
Challenge Description:	Electricity theft causes a DISCOM to experience significant financial losses, especially on JGY Feeders.
Exact Problem to be Solved:	Despite having an insulated network, people are still tapping into the power from LT lines and service wires. HT lines and individual transformers are the foundation of a successful distribution system (Micro level HVDS and use of 11/1.1 KV transformer and 1.1 KV HT line with 1.1 / 0.230 KV transformers). The GPRD Cell is incubating this, but it has to be cost-effective and broadly used.
Target Users:	JGY residential consumer specifically in rural sector.
Expected Outcomes:	Reduction in distribution losses.
Potential Impacts:	Reduction in financial losses.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 036
Segment:	Operation Cost
Challenge Title:	Different Set-off Calculation Methodologies for Each Division
Challenge Description:	Currently, set-off calculations for HT/EHT customers who obtain power through OPEN ACCESS from both conventional and non-conventional sources are done in Excel using tabulated formats, varying methodologies, and interpreting policy clauses in different ways depending on the applicable charges and losses. The approach varies between divisions and DISCOMs as well. This could result in an incorrect energy set-off calculation, which would cost the DISCOM or the consumer money.
Exact Problem to be Solved:	Set-off and related costs payable/recoverable calculation requires an IT-based solution.
Target Users:	Discom employees and HT customers were hired to perform set-off calculating work.
Expected Outcomes:	Development of a precise and universal set-offoff calculation approach for all DISCOMs.
Potential Impacts:	Decrease in unexpected Misinterpretation of the applicable charges and losses led to a loss of revenue.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 037
Segment:	Equipment Condition Monitoring
Challenge Title:	Automatic Distribution Transformers to Monitor Various Parameters such as Temperature, Oil Level, and Load Condition
Challenge Description:	The loss of service to customers and the associated repair and replacement costs for the distribution utilities will result from the failure of distribution transformers. Additionally, failing to examine the transformer's internal parameters, including its temperature, current draw, and oil level, could cause the transformer to accidentally explode and cause fatalities among people.
Exact Problem to be Solved:	• The upkeep of the distribution transformers is one of the biggest problems with power distribution. As of now, only the outwardly obvious issues are fixed by the maintenance crew; interior problems like Temperature rising during load circumstances, over current, and insulation conditions of the DT cannot be monitored. • In the 2005 judgment H.S.E.B and others v. Ram Nath, the Honorable Supreme Court of India issued the following observations: "As distribution utilities are engaged in an activity that is inherently dangerous, it is their responsibility to ensure that no harm emerges from their operations.
Target Users:	Consumers and power distribution utilities.

Expected Outcomes:

- If we were to suggest creating a system based on a microprocessor or any other cutting-edge technology for tracking the different internal characteristics like temperature, oil level, current, etc.
- By logging important operating indications, a mobile embedded system may also be designed and implemented to monitor and assess the health of transformers.
- Receives information via SMS on the transformer's operational status.

Potential Impacts:

- Operational efficiency improvement
- Improvement in the Safety of the public

Open Innovation Challenge 2022 - Energy Sector

Challenge ID: PS 038

Segment: Safety

Challenge Title: Leakage Current in LT System Needs Protection System

Challenge Description:

- The bulk of accidents involving people, animals, and both fatal and non-fatal injuries happened as a result of LT network leakage current.
- No, any currently installed system is protected from leakage current on the LT network.

Exact Problem to be Solved:

- As established by the Electricity Act, power distribution utilities have several responsibilities. Additionally, every electrical system with a load of more than 2 KW must be controlled by an earth leakage prevention device, according to Safety Regulation 42.
- For the time being, every DTR is a dummy consumer with a load of more than 2 kW and no protection against leakage current. Our current LT side protection will offer security in the event of a short circuit or an excessive current.
- Our LT network poles provide an Earthing Path via the GI Earthing system, but sadly, this mechanism is what caused the catastrophe because we now lack a protection system for monitoring leakage on the LT side.
- Additionally, article 6.2 of the supply code requires that every consumer (including us as dummy consumers) install a protective device.

Target Users: Consumers and Power Distribution Utilities

Expected Outcomes: If we can come up with technological fixes for this based on microcontrollers or other cutting-edge technology, we can greatly reduce the likelihood of accidents happening and fulfil our legal and safety requirements.

Potential Impacts:

- Operational efficiency improvement.
- Improvement in the Safety of the public.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 039
Segment:	Operation Cost and Maintenance
Challenge Title:	Damaged Conductor Relay
Challenge Description:	At the SS end, broken conductor relays are available in accordance with GERC regulations. There are instances where BCR are not activated when a conductor breaks on the receiving side.
Exact Problem to be Solved:	The relay must be equipped with the capability to trip the appropriate feeder quickly in the event of a broken conductor.
Target Users:	Power Distribution Utilities
Expected Outcomes:	Protection and Safety
Potential Impacts:	Safety of Consumers/ Employees

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 040
Segment:	AT &C
Challenge Title:	Pole Earthing by Reinforced GI wire
Challenge Description:	At the moment, earthing is done using coil-type earthing and GI wire attached from the coil to the top side of the construction. GI wire theft incidents are common in rural areas, indicating that the system is ineffective.
Exact Problem to be Solved:	PSC poles are created from steel wire that has been strengthened. Additionally, GI wire in conduit should be installed from the top to the bottom of the pole to prevent theft incidents.
Target Users:	Consumers and Power Distribution Utilities
Expected Outcomes:	Theft of GI wire could be avoided.
Potential Impacts:	The safety of people and animals shall be upheld, as well as the earthing's quality.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 041
Segment:	Safety
Challenge Title:	Flexible Hand Gloves for Safety Devices
Challenge Description:	• At the moment, every individual safety device is in use. • Employees can't easily handle operations due to the less flexible hand gloves now in use.
Exact Problem to be Solved:	Combination safety suit with a helmet, safety belt, flexible rubber safety shoes, and flexible hand gloves that resemble surgical gloves.
Target Users:	Power Distribution Utilities
Expected Outcomes:	Operation Flexibility
Potential Impacts:	Safety of DISCOM line staff.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 042
Segment\:	Operation Cost and Maintenance
Challenge Title:	How to Make Poles/Lines Stronger and How to Build New Poles in the Water Logging Areas and the AG Field
Challenge Description:	As of right now, a lot of DISCOM locations are flooded during the monsoon. Additionally, as the water level in canals used for irrigation in these areas rises, many DISCOM poles are submerged in the water and frequently topple over or tilt.
Exact Problem to be Solved:	How to get around the difficulties of setting up and keeping in place communication materials like poles and lines in flooded areas. offering a crane on a cantilever.
Target Users:	• Consumers of DISCOM. • DISCOM's technical staff/Engineer.
Expected Outcomes:	• Increase reliability/continuity. • Reduce complaints of consumers.
Potential Impacts:	• Improve image of the company. • Improve reliability index.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 043
Segment:	Equipment Condition Monitoring
Challenge Title:	Expertise of Overhead LT/HT AB Cable Portable Fault Detector Machine and HT ABC/XLPE Cable Jointing Kit
Challenge Description:	Since DISCOMs have been using traditional overhead wires for so long, they are not the correct answer. Both line employees and engineers must use this brand-new system. • Due to inexperience with laying and handling, HT ABC regularly gets fired. • A costly component, HT ABC failure results in a loss of power and increases O&M costs. • To solve the issue, portable fault detection equipment that can determine the distance of the fault and the type of phase identity (R, Y, or B) can be very helpful. Offering a crane on a cantilever. • Some small AB Cable issues take longer to fix during the rainy season.
Exact Problem to be Solved:	• A dedicated team for laying and jointing operations may be able to control the frequent failure of HT ABC XLPE. • Faults can be easily identified.
Target Users:	DISCOM / Line Staff of DISCOM workers with electricity.
Expected Outcomes:	• Better power reliability. • Consumer satisfaction through service excellence. • Reduction in HTABC faults. • The distance with location and type of fault can be located from the portable machine.
Potential Impacts:	Increased power supply reliability due to faster fault detectors (attend quickly).

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 044
Segment:	Power Interruption and Operation Cost
Challenge Title:	How to Maintain a Lay Line and a Power Supply in the Hilly Area
Challenge Description:	• Because it takes too long to install and maintain power lines, DISCOMs struggle to supply power in mountainous areas on time. Taking/holding supplies for line poles, conductors, and fabrication makes it very challenging to reach from wooded areas. • In terms of power dependability and safety, earthing is a crucial element. Due to the hard rocks and little humidity in this area, earthing cannot be applied properly or effectively. Additionally, setting up poles in difficult terrain takes longer and involves more labor.
Exact Problem to be Solved:	• Immediately power delivery and address their complaints, ensuring that everyone has access to electricity around-the-clock. • In order to give earthing (chemical earthing) in a rocky environment, there needs be a correct technique. Additionally, there should be methods for setting up poles in such locations.
Target Users:	People Living in Hilly/Forest Areas
Expected Outcomes:	• Development of people of the country. • Improve living standard of the people. • Increase in power reliability and consumers/employees safety.
Potential Impacts:	• Improve the living standard of the people. • Development of people of the country. • Power reliability and safety.

Open Innovation Challenge 2022 - Energy Sector

Challenge ID:	PS 045
Segment:	Operation Cost and Maintenance
Challenge Title:	Development of a consumer transformer and the process of connecting a high-speed network in a vertical development area
Challenge Description:	• Modern urban and municipal regions are rapidly developing vertically in the form of multi-story buildings due to space limitations. Transformer installation requires space, which the developer or society must give. • The transformer's maximum capacity is 500 KVA. When a building's total load from all units exceeds 500 KVA, MGVCL must install 3 to 4 No. 200 KVA Transformers to handle the load. However, due to horizontal space restrictions, it can be challenging to fit 3 to 4 transformers. Additionally, there are space restrictions for installing meters on the ground floor of a multi-story building. • The installation of meters on each floor to handle HT customers is demanded by developers and society (Having a load above 100KVA).
Exact Problem to be Solved:	• To process for compact sized transformer and CT/PT unit. • To allow multilevel space for transformer and CT/PT unit. • For the purpose of handling these kinds of jobs, the idea of a stretcher lift might also be included. • To be framed is a policy for transformer and metre installation in the event of vertical development.
Target Users:	Consumers & DISCOMS
Expected Outcomes:	Space constraints will overcome in congested areas.
Potential Impacts:	• Better space utilization. • Safety & grievances.

Open Innovation Challenge 2022 - Energy Sector

Innovate for Energy

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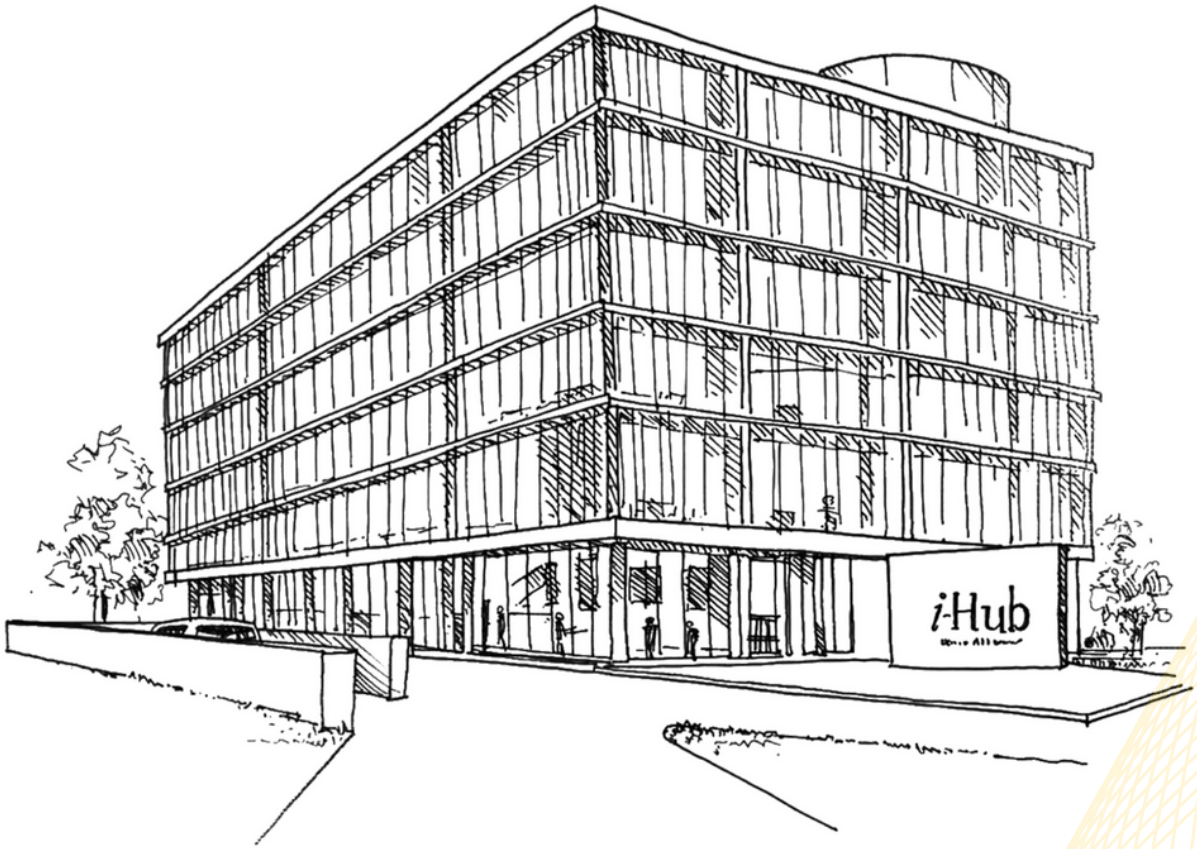

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