

IT INTERVENTIONS FOR POWER REFORMS IN UPCL UNDER R-APDRP

~~~Author~~~  
**JAYANT SINHA**  
**DGM (IT/ R-APDRP)**

### ***Introduction***

Several key reforms have been envisaged by UPCL under Restructured APDRP scheme announced by the Ministry of Power, during the XI<sup>th</sup> plan (2007-2012) period. Uttarakhand has been accorded a special status under the programme and 31 towns have been identified for power reforms. UPCL being the premier and the only power distribution utility in the state has the onerous task of implementing a slew of IT initiatives to enhance the operational efficiency, commercial viability, capability building and fiscal management. The main focus areas of reforms in UPCL are:

1. Reduction of ATC losses
2. Strengthening of distribution network
3. Total energy accounting using AMR
4. Robust MIS for effective system monitoring

### **Reduction of ATC Losses**

In the DPR submitted to the Ministry of Power, the following works have been planned by UPCL during the XI<sup>th</sup> plan to check ATC losses:

1. *Segregation of Agriculture Feeders*: Separate feeders have been planned to supply agricultural loads, distinct from the feeder supplying the non-agricultural loads in rural areas. This facilitates proper accounting and removes distortions in loss measurement arising due to subsidies, un-metered agricultural loads and peak-hour load measurements. The Integrated Energy Policy also recommends bifurcation of agriculture PTW connections from the non-PTW connections in all rural feeders. It further recommends the use of available technologies to limit and accurately measure the amount of agriculture load consumed.
2. *Metering of Agricultural Consumers*: Metering of agricultural consumption allows quantifiable supply to agriculture which is a necessary condition for transparent subsidy mechanism. Though the legal framework provides for compulsory metering of electricity supply, agricultural consumers in UPCL are supplied un-metered power on flat rate basis (Rupees/ BHP/ Month). The system of un-metered supply at flat rates for agricultural PTW consumers makes it difficult to have correct estimates of energy consumption and losses. UPCL is keen to adopt ring-fencing of the town feeders, have separate metered agricultural feeders and install energy meters at all import/ export points.
3. *Conversion to HVDS*: Large scale expansion of urban and rural electrical network has resulted in considerable build-up of LT distribution system. To meet the increasing demand, DTRs are being constantly overloaded. The length of LT circuits is also increasing resulting in high losses in LT lines, excessive voltage drops, frequent faults on LT network and higher failure rate of distribution transformers. High Voltage Distribution System (HVDS) envisages running 11 KV lines right up to the loads and setting up small sized DTRs and extend supply with LT lines over shorter distances. This leads to considerable reduction in ATC losses, improvement in voltage conditions, reduction in DTR failure rate, better

load monitoring and lesser system outages. UPCL is planning large scale implementation of HVDS in order to bring down the LT: HT ratio all across the state of Uttarakhand. The investment on HVDS can be easily offset through benefits in ATC loss reduction, load management and system availability.

### **Strengthening of distribution network**

Improvement in the LT distribution system is also envisaged under R-APDRP implementation during XI<sup>th</sup> plan. Following are some of the major IT interventions planned by UPCL in this direction:

*Reliability Monitoring of Power Distribution Systems:* UPCL plans to develop a system for complete reliability monitoring of its distribution systems from substation to the consumer meter. Through the system, it should be possible to monitor the health of substation 33 kV/ 11 kV feeders supplying power to the high voltage consumers and distribution transformers. There are several metrics to assess the reliability of the distribution network. Customer average interruption duration index (CAIDI) is defined as the ratio of Customer-hours available over a given time period to the total number of Customer-hours that should have been available over the same time period. UPCL's objective is bring the reliability of distribution system at par with the global best practices in terms of the outage duration and interruptions.

*GIS mapping of distribution network:* UPCL plans to create a Geospatial database of its distribution network elements. The network elements shall be codified in an assets database. The existing network shall be geo-referenced on GIS base maps. The consumers shall be mapped to the corresponding electrical address, referenced through the GIS application.

### **Total Energy Accounting using AMR**

Improvement in metering, billing and collection (MBC) is a critical requirement in the R-APDRP action plan of UPCL for total energy accounting. UPCL's objective is to integrate a variety of metering systems currently operational in the organization with the billing system, in a seamless manner without manual intervention, through suitable IT initiatives. The metering and billing systems of UPCL is planned to be seamlessly interfaced with asset management, outage management and CRM. Automated meter reading (AMR) is an important tool for effective metering and total accounting of energy input and supplies, which UPCL wishes to introduce all over the state of Uttarakhand, starting with high-value industrial, institutional and commercial consumers and later for agricultural and LT consumers as well. Pre-paid metering is also being targeted for willing consumers for automating bill payment and collection.

### **Automated Meter Reading (AMR) and Meter Data Management (MDM)**

Electricity distribution utilities have to install and maintain meters at all consumer locations, for proper measurement and billing of electric supply. Since the electric meters record the value of electricity consumption for utility billing purpose, it would not be an exaggeration to term the energy meter as "cash box" of the utility. While single phase energy meters are used for small domestic and commercial consumers

(up to 4 KW), three-phase meters are used for industrial, agricultural and large domestic and commercial consumers (above 4 KW).

A need has been felt in UPCL to capture energy consumption data and load pattern of consumers during various time intervals for analysis purposes, in order to prevent electricity theft, control revenue leakages and manage load effectively. Under the scope of AMR, UPCL plans to introduce an integrated Meter Data Management system for bi-directional communication between various metering points and the centralized Meter Data Logging system. UPCL wishes to leverage the capability of MDM to directly control the energy consumption by setting load threshold at the meter which when exceeded trips the meter circuit breaker. This will help UPCL to curb huge revenue losses on account of overdrawing.

Meter Data Management system is the single point of management, processing and integration with the utility billing system and related MIS. It incorporates all relevant business rules regarding meter data validation, updation and load estimation. UPCL plans to have the following functionalities in MDM:

1. Exceptions handling and processing
2. Flexible data aggregation for various consumer categories
3. Integration with outage management system
4. Integration with customer information, asset management, outage management, billing and energy accounting system
5. Meter data analysis and reporting

### **Prepaid Metering System**

Prepaid metering is a system by which consumers use smart card for a pre-set value of electricity that they wish to consume. The amount paid along with other consumer information is encoded in the smart card. To transfer the credit, the consumer inserts the card in the prepaid meter, which reads the data and when the pre-paid energy is used up, the consumer gets the card recharged/ reprogrammed in the utility office.

The system has the capability of programming with multiple rates, time of use tariffs, etc. The use of prepaid meters totally eliminates cases of non-payment or delayed payment. It also enables transfer of reliable, accurate and up-to-date energy consumption and billing data, as per the tariff. This information can be utilized by the utility for demand forecasting and controlling peak demands. It also eliminates problems related to meter reading, bill distribution and billing disputes.

### **Robust MIS for effective system monitoring**

UPCL plans to build up a robust MIS application which cuts across various business functions of the organization. There is a constant need to provide reliable, consistent, secure and accurate operational data “anytime, anywhere” to enable departments make timely and right decisions. The purpose of MIS in UPCL is to integrate silos of information, eliminate data redundancy and provide a unified platform for accessing enterprise data in order to increase operational and commercial efficiency, enhance transparency and improve consumer services.

---