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DISCOM RENEWABLE ENERGY PROCUREMENT OPTIMIZATION AND SMART ESTIMATION (REPOSE) SOFTWARE

DISCOM Renewable Energy Procurement Optimization and Smart Estimation (REPOSE) is a sophisticated, interactive, robust and dynamic software with a comprehensive set of advanced and scientific demand forecast methods, integrated resource mapping models and power procurement optimization technology built into three modules. This software helps distribution companies (DISCOMs) forecast demand, establish resource plans and optimize future procurement costs. DISCOM REPOSE provides utilities with hourly, weekly and yearly visualizations of demand and resource adequacy (type, amount and time) over a 15-year horizon.

KEY CHALLENGES IN RESOURCE PLANNING

Distribution companies traditionally base their resource plans on compound annual growth rates (CAGR) and historical data trends. This causes them to over- or underestimate demand, which leads to higher power procurement costs (due to overestimation) or load shedding (underestimation). Furthermore, DISCOMs do not have the tools or scientific methods to accommodate higher amounts of variable renewable energy (which is cheaper than conventional energy), econometric policies, or innovations like electric vehicles, distributed energy resources, open access and storage. DISCOMs are unable to do demand profile-based procurement leading to either surplus/deficit purchase of power. This tool addresses these challenges. The tool has graphical user interface and helps user to develop options by analyzing various scenarios.

WHY DISCOM REPOSE?

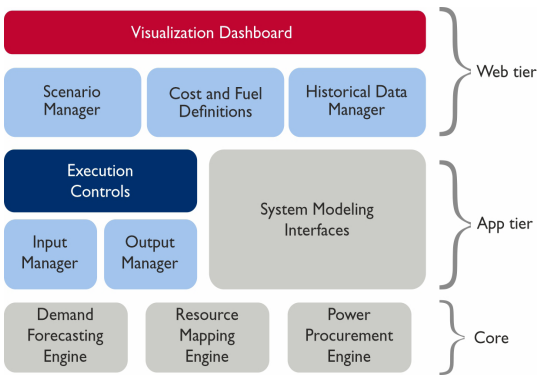
- Increase renewable energy in the grid and manage its constraints and uncertainties
- Optimize the resources available with a clean/green energy option
- Account for policies, compliance, electric vehicles and other factors
- Forecast demand using advanced methods or tools
- Create an optimal generation resource map by choosing the best generation mix to maintain generation adequacy
- Optimize existing and future contracts or energy exchanges and reduce the overall generation cost and tariff for consumers
- Develop procurement plans for the long and medium term with flexible generation assessments to meet deficits

HOW DISCOM REPOSE ADDRESSES THE CHALLENGES

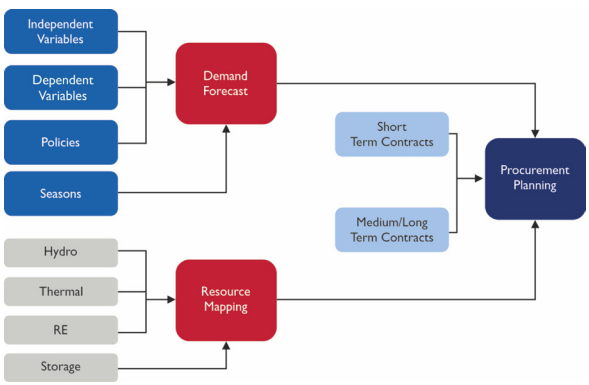
This software lets DISCOMs study a variety of scenarios to optimize their power procurement plans with a generation mix from available resources, future contracts and renewable energy maximization, while considering renewable energy's uncertainty and variability. DISCOM REPOSE provides insights into how DISCOMs can reduce their overall generation cost, provides granular projections of demand and generation adequacy, and helps to increase renewable energy penetration.

- *Comprehensive Modeling:* Allows users to configure energy and econometric variables, drivers, policies, generation resources, commercial and technical constraints, renewable purchase obligation targets, and consumer categories and their historical consumption patterns.
- *Complex Algorithms:* Uses scientific methods to forecast long- and medium-term demand, factors affecting demand and probabilistic methods to address demand variability.
- *Resource Optimization:* Uses tested and industry-recognized methods to generate optimal generation mix plans with available resources and future contracts.
- *Outputs:* Provides outputs on flexible generation requirements to address deficits through renewable energy.
- *Scenario Creation:* Allows users to create varied scenarios to observe how different optimizations work under specific conditions without affecting the base case.
- *State-of-the-Art Visualization:* Displays highly interactive and exhaustive dashboards that make it easier for users to analyze simulation outcomes.
- *Accuracy:* The tool has been tested on the data of Assam and Jharkhand and accuracy level is found within 5% band.
- *Easy Input Entry:* The tool provides flexibility to user to enter data either manually or through excel.
- *Resource Plan Optimization:* The tool has flexibility to optimize resource plan based on cost, higher RE uptake, lower emission or on any combination of the three.

User Interfaces



Integral Elements

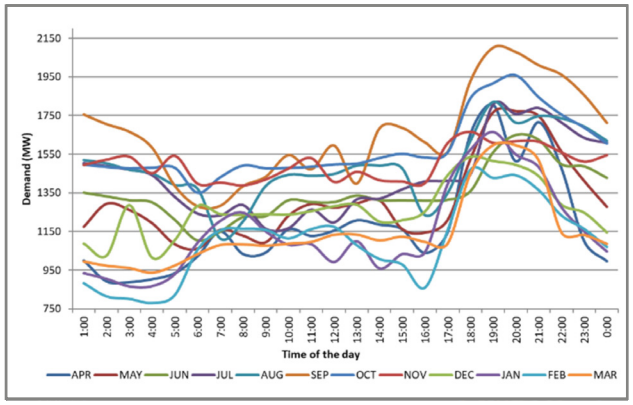


SOFTWARE MODULES

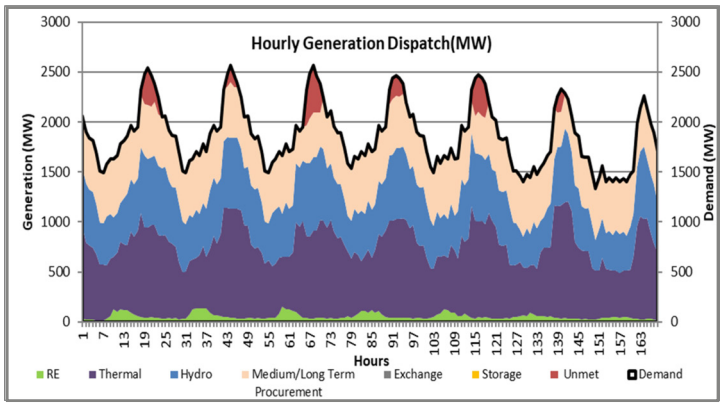
	Demand Forecasting	Integrated Resource Mapping	Power Procurement Optimization
Input	Consumer Data Historical Demand Data Weather Data Demographic Variables Econometric Variables Policies Drivers • Captive Power Plant and Open Access • Aggregate Technical and Commercial Losses • Distributed Energy Resources • Electric Vehicles • Demand-Side Management	**Generation type** • Thermal (coal, gas, etc.) • Hydro (reservoir-based and run-of-river) • Renewables (wind, solar, etc.) **Constraints** • Technical (ramp rates, technical minimum, etc.) • Commercial (cost)	**Generation type** • Thermal (coal, gas, etc.) • Hydro (reservoir-based and run-of-river) • Renewables (wind, solar, etc.) **Constraints** • Technical (ramp rates, technical minimum, etc.) • Commercial (cost) • Future Contracts
Algorithm	• CAGR • Trend Analysis • Econometric • Auto Regressive Integrated Moving Average (ARIMA) • Artificial Neural Network • Partial End Use	• Mixed Integer Linear Programming (MILP)	• Mixed Integer Linear Programming (MILP)
Output	**Long-Term Forecast (up to 15 years)** • Annual Energy Consumption (MU) • Annual Peak Demand (MW) **Medium Term (3 to 5 years)** • Seasonal/Monthly Energy Forecast (MU) • Seasonal/Monthly Peak Demand (MU) • Hourly Load Profile (MW) • Weekday / Weekend Demand (MW & MU) **Options Development** Scenario, Sensitivity and Probabilistic Analysis	**Long Term Generation Mapping** • Annual Generation (MU) • Annual Demand (MW) • Retiring and upcoming capacities **Medium Term Generation Mapping** • Hourly Load Profile (MW) • Hourly Generation Dispatch (MW) • Weekly Generation Mapping (MU) • Seasonal Surplus/Deficit • Generation Statistics (dispatch and cost parameters, etc.)	**Demand-Resource Plan** Plan Selection Based on Scenarios • Cost Minimization • Emission Minimization • Higher RE Uptake • Combination of Scenarios • Flexible Generation Assessment and Storage Requirements

OUTPUTS GENERATED BY DISCOM REPOSE SOFTWARE

Hourly Demand Profile



Hourly Generation Dispatch



Outputs based on illustrative data.

Note: Hourly demand coupled with visibility of type, amount and time of resource generation (thermal, solar, hydro, storage, etc.) is important to consider in a renewable energy-rich environment.

SOFTWARE ACCESS

DISCOM REPOSE is freely available on the USAID PACE-D 2.0 RE website, along with brochures and fact sheets on the software's inputs, methodology and outputs.

The software requires minimum hardware and software specifications for installation; for details, please refer to the installation guide. The user manual and frequently asked questions are available here - https://www.pace-d.com/resources/.

ABOUT USAID PACE-D 2.0 RE

Partnership to Advance Clean Energy – Deployment (PACE-D 2.0 RE) program is developed by U.S. Agency for International Development (USAID) with India's Ministry of New and Renewable Energy to help national and state partners develop an enabling environment for faster, more cost-effective deployment of renewable energy. PACE-D 2.0 RE partners with DISCOMs from Assam, Jharkhand and Gujarat to adopt innovative approaches to resource planning, optimizing power procurements with renewable energy options. The views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government. For more information, visit https://www.pace-d.com/.

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