Digital Energy
# Renewables & DER Orchestration
Forecasting

ANTICIPATING POTENTIAL VIOLATIONS CAUSED BY DERs, IN A SYSTEMATIC AUTOMATED WAY, TO KEEP GRID SAFE DESPITE INTERMITTENCY

Enable electrical grid operators to anticipate potential violations that DERs could cause by processing historical data and explanatory variables to generate forecasts of load and intermittent generation from DERs. Nurtures look-ahead powerflow analysis, which identifies location, severity and timing of potential upcoming grid reliability issues.
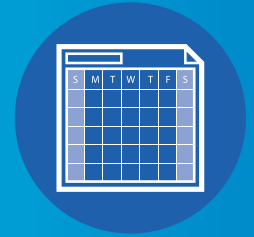
BUSINESS CHALLENGE

Increasing penetration of Distributed Energy Resources (DERs) and renewable generation dramatically increases the intermittency and dynamics of energy flows on the electrical grids. Operating the grid solely in real-time increases operators stress and reduces their options to act – preventing the use of measures which require anticipation.

REAL RESULTS

Accurate forecasts for all use cases

Configuring and automating as many forecasts use cases as required, for both Transmission and Distribution grids.

Versatile, robust, standard input

Load, PV, Wind. Physical and machine learning algorithms. Feature-rich and max use of standards (CIM, GRIB, NOAA).

Adapting to purpose

Combine, scale, aggregate, disaggregate, visualize, alarm.

OVERVIEW
Accurate, Scalable, Versatile forecasts

GE's DER Orchestration Forecasting module is designed to augment the capabilities of the existing control rooms of electrical grid operators, helping them cope with the intermittency of renewable generation (wind, photovoltaics, etc.), and more generally the intermittency of new Distributed Energy Resource (DER) devices connecting to the grid (heat pumps, controllable loads, electrical vehicle, etc.).

This intermittency dictates that it is no longer possible to operate the grid exclusively in real-time. Operators must have a forward-looking view of potential violations that may occur in the hours/days ahead so they have time to anticipate remedial actions. This look-ahead powerflow analysis process is fueled by forecasts of load and distributed generation, which is what GE's Forecasting module provides.

Forecasting is delivered as a containerized microservice, for easy integration on both GE or non-GE ADMS (Advanced Distribution Management Solution), AEMS (Advanced Energy Management System), AMMS (Advanced Market Management System) or GIS/Planning solutions. It employs weather forecasts, historical data and calendar data, and also houses a library of forecast algorithms depending on the nature of the entity to forecast (load, PV site, wind site etc.), the type of input data available, and also depending on the accuracy sought. Forecasting can run a full range of forecasts in parallel. It also fuels GE's Look-ahead powerflow analysis module, which automates look-ahead powerflow studies in a systematic manner. Alarms are raised if upcoming violations are anticipated, and a one-click drill down is offered to the operator to present a study mode window of the relevant grid perimeter simulating the time of the anticipated violation. The operator is warned, and has all the context - and few hours or days - to work out remedial actions.

Digital Energy
Renewables & DER Orchestration
Forecasting

VALUE DELIVERED

Standard - Easy to Integrate & Configure	Versatile & Accurate	Automated	Robust & Scalable	Nurturing Look-ahead Powerflow Analysis Studies
Delivered as an independent containerized module, with all REST API interfaces for easy integration of inputs and outputs. Configuration via UI. Input data leveraging all standards available (CIM model, GRIB weather forecast, etc.). NOAA adapter.	Load, PV, wind. Machine learning and physical algorithms. Combine, scale, aggregate, disaggregate, group, to fit to every use case. Split of net load vs. native load and renewable/distributed generation. Forecast measurements if required. Accuracy tracking. Uncertainty forecasting.	Defining as many forecasts as use cases can cover (entities, voltage level, horizon, scan rate, refresh rate, algorithms to use). All use cases will run in parallel, refreshing periodically or whenever new input data is available. Alarming on value, ramp, deviation vs. previous forecast, missing input, etc.	Ability to model a full Transmission and/or Distribution grid. VEE (Verification, Estimation Editing) to clean input data. Bellwether to estimate forecasts of non-measured sites. Advanced AUT/AUZ. Built using container technology (Docker, k8s) for full automated horizontal scalability.	ADMS and AEMS offer automated computation of powerflow for the upcoming hours/days, nurtured by Forecasting. Synthesizes potential upcoming violations (time, grid location, type, severity) for the operator to drill down and work out remedial actions in study mode in advance.

OTHER KEY DER ORCHESTRATION MODULES

Plan, Model & Connect

DER Modeling

Model single and aggregated DERs with expanded attributes (nameplate ratings, control modes, contractual availability, operational constraints, etc.),. Key enabler for all planning and operational DER apps. *Core capability of GIS, Planning, ADMS, AEMS and AMMS.*

Electric Connection Checker

Automate screening of new loads and DER connection requests. Allows utility to easily benchmark connection options that best protect grid while serving DER prosumer. Monitor hosting capacity. *Cloud-based optional module, retrieving data from GIS.*

DER Registration, Provisioning, Commissioning

Automated workflow for DER On-Boarding. Record DER connection details with program enrollments. Firmware &/or configuration updates. DER operational lifecycle management and remote DER settings verifications. *Optional module and capability of ADMS.*

IEEE 2030.5 Gateway

The most advanced industry standard to monitor and control DERs – single, grouped or aggregators. Builds on CIM, https, and others, to provide a comprehensive data model and the ability to securely connect over the internet to even the smallest DERs. *Optional module and capability of ADMS.*

Operate, Optimize & Trade

DER-Aware Power Apps

Understand impact of DERs on the operation of your grid, and leverage DER controls to complement traditional grid levers. Understand and act on backfeed (powerflow/SE/CA), hidden load (FLISR), new voltage profiles (IVVC). *Core capability of ADMS and AEMS.*

Adaptive Network Management

Protect grid reliability while avoiding CAPEX through adaptive curtailment, enabling generators to connect more while averting the need for utilities to reinforce their network. *Optional capability of ADMS and AEMS.*

Look-ahead Powerflow Analysis

Anticipate potential violations in the coming days/hours. Run systematic look-ahead powerflow analysis for a configurable time period in the future, nurtured by Forecasting. Synthesize potential upcoming violations (time, grid location, type, severity) for the operator to drill down and work out remedial actions in study mode in advance. *Optional capability of ADMS and AEMS.*

Look-ahead Optimization

Optimization module providing operator with remedial optimum actions plans they can elect to approve and execute to solve for upcoming violations identified by Look-ahead powerflow analysis. Single point in time or multi-time point. Active power and Reactive Power. Leveraging all available control levers — DERs and non-DERs. *Optional module and capability of ADMS and AEMS.*

Flexibility Market & Flex Request Engine

Enable DSOs or TSOs to access Flexibility Markets in order to orchestrate flex trades between TSOs/ISOs, DNOs/DSOs and market parties (retailers/aggregators/IPPs). Run flexibility markets. Optional module of ADMS. *Optional capability of AMMS.*

GE's Forecasting module brings the versatile and robust foundation for electrical grid operators to address the variety of their look-ahead use cases -to cope with Renewables and DERs intermittency.

Contact Us
ge.com/digital/sales-contact-me