GRIDSCALE X™

LV Insights
Product Sheet

LV Insights is a modern low voltage management software that enables users to monitor their low voltage grids, leveraging existing data to create a digital model of the low voltage grid, scale up grid planning processes and assessment of connection requests to keep pace with energy transition.

www.siemens.com/lv-insights

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LV Insights Product Sheet
(Documentation)

General	
Value Proposition	LV Insights supports grid planners of distribution systems in four main areas: 1. **Transparency**: Live visibility in the lower end of the grid with (near) real time observability of topology and grid state utilizing existing metering devices and artificial intelligence to make the most of the existing equipment. Sharing this information across multiple departments without granting access to mission critical SCADA system. 2. **Grid Digital Twin**: Build trustworthy grid models of the distribution grid and merged it with dynamic grid that is the foundation of a grid digital twin for simulation-ready grid models. 3. **Grid Impact Assessment:** Advanced data exchange and analytics to detect limit violations, enable potential grid segments being operated closer to their operational limits and optimize investment and asset management strategy. 4. **Grid Connection Request Assessment:** scale the process of technical assessment of grid connection requests with workflow engine, preparation of request specific simulation-ready grid models and automation of assessments with state-of-the art simulations engine.
Prerequisites & Specific Terms	

Operating systems and web browsers for users	LV Insights is a SaaS with a web-based browser frontend for use on desktop computers or notebooks. LV Insights requires a recent version of an HTML5 capable Internet Browser, e.g. Google Chrome
Use Restriction	You acknowledge that insights provided by LV Insights are limited to the grid model based on the Asset Data, connectivity information, mapping of entities and telemetry provided by the Customer and results may not fully correspond to the real-world situation. The interpretation, implementation and utilization of reports, concepts and results is the sole responsibility of the Customer. Siemens does not assume any liability, warranty, or guarantee for the feasibility or usability of reports, concepts, and results, nor for actions or omissions based on the reports, concepts, proposals or recommendations.
Onboarding Services	Onboarding services are required for the full use of LV Insights and must be ordered separately.

Description & Functionalities

Grid model building	Grid model building module of LV Insights provides the ability to visually build grid models for LV Insights by leveraging relevant data sources (e.g. GIS, ERP), processing the data and directly verifying the progress using a geographical user interface. The required data from relevant sources is combined and integrated in a Grid Model that is flexible and extendable to meet changing needs of LV Insights over time. The electrical domain of data is leveraged to logically split the grid model in circuits, facilitating the user navigation and data analysis step. A robust and flexible grid model validation engine ensures data is validated before it reaches operations. Users can directly relate to erroneous grid circuits on the same geographic interface, which helps with the prioritization of data correction in source systems. Selected examples of validation rules include • Connectivity • Completeness • Electrical properties • Consistency of voltage • Relationship (parent – child)

	Once all data model prerequisites for LV Insights are fulfilled and validated the datasets are serialized according to the requirements and structure of operational needs of LV Insights. Along this process the consistency of unique IDs is fulfilled, therefore guaranteeing interoperability. Since grid models are subject to constant change, the grid model building module subscribes to and receives model changes from master systems, updates and re-validates the grid model and sends model changes to LV Insights.
Low Voltage Transparency	The low voltage transparency provides a visual grid model representation comprising medium and low voltage equipment. A live visualization of current topology and grid state is based on available measurements and (optional) manual updates of (non-remote-controlled) breaking equipment. A schematic representation of primary and secondary substations, and cable cabinets are automatically generated and can be activated. The combination of a geographical, schematic view and software-inherent understanding of the electrical circuit enables users to navigate within the grid and drill down into details, when necessary, based on smart topology highlighting. Substations, cable cabinets and connection points are high-level elements in LV Insights automatically aggregating underlying equipment to reduce cognitive load of users. The following aggregations are supported • Connection points aggregate multiple service delivery points, that is defined as the point of delivery at which a utility service, in this case electricity, is supplied. • Primary substations aggregate transformers and breaking equipment relevant to denote medium voltage feeders • Secondary substations aggregate transformers and breaking equipment relevant to denote low voltage feeders.

	• Cable cabinets aggregate breaking equipment relevant to denote low voltage feeder (sub-) segments Visual representation and details depend on the available grid model for certain grid areas including equipment and connectivity information from medium voltage down to low voltage service delivery points.
Telemetry Data	Any telemetry data from the field through a SCADA system or other systems (e.g. MDM or IoT headend) can be ingested in LV Insights and is automatically mapped to the available equipment. Relevant attributes and IDs are mapped in the grid model builder module ensuring consistency and compatibility. Telemetry data preview is provided on equipment level and automatically aggregated on connection point level including upper and lower limits to avoid misinterpretation. Detailed analysis can be conducted over historic data using the data analysis component providing time range selection to observe patterns.
Grid Impact Assessment	LV Insights can identify equipment and areas of the grid which are already impacted by adoption of DERs, or which are close to their operational / predefined limits, by analyzing the number, frequency, and duration of capacity and voltage near-violations and violations over time from historical telemetry data, and then calculating a Grid Impact Score. The Grid Impact Score is calculated at the connection point, feeder, and secondary substation level. Based on the score, equipment on the grid can be visually assessed for impact severity and criticality. The definition of what constitutes a near-violation and what constitutes a violation can be configured, as can the time period over which the Grid Impact Score is calculated.
Simulation-ready grid models	A grid model extract for a power transformer of a primary or secondary substation can be downloaded for further analysis in grid planning and simulation tools.
Grid connection request assessment (Pre-view feature)	LV Insights supports the workflow of technical assessment of grid connection requests. Connection request cases are created via an API call.

	The grid connection request case is mapped to the grid circuits and grid segment is traced to the next secondary respectively primary substation. The simulation-ready grid model of this grid segment in normal state can be downloaded for studies in grid planning and simulation tools.
Administration, and data access	
Authentication and Access	Authentication and authorization are on User level based on the authentication method supported by the customer's identity and access provider (IDP) supporting openIDConnect.
Administrator	Permissions to administrate users of LV Insights and access the Administrative Interface.
Standard User	Permissions to access the geospatial data visualization. Typical user of LV Insights with full access to all functionality besides administrative tasks.
Grid Model Building User / Grid Model Engineer	Permission to import, configure and adapt grid models using the grid model management feature of LV Insights.
Administrative Interface	The administrative interface allows managing users, roles, groups, and the integration with identity providers. For every user, an individual login is required. Users are also permitted to access and utilize the user management. The administrative interface provides the ability to issue and manage client credentials that can be used to access data programmatically.
Telemetry Interface	All measurements (analogs, smart meters readings) and information (e.g. switch states) coming from the field, or another system are treated as telemetry data. The telemetry interface is responsible for ingesting any type of telemetry data from various headend systems. The interface has the following characteristics: • Data format is based on IEC 61968 (CIM) • Event-based interface It is Customers responsibility to comply with the Telemetry Interface characteristics stated above.

Client Credentials	The client credentials are used by clients to obtain an access token outside of the context of a user to utilize the provided interfaces.
SaaS Operational Environment and Services	
Security	Siemens implements and maintains a cyber security framework based on ISO/IEC 27001. Siemens will • handle security related incident identification, monitoring and remediation according to ISO/IEC 27001 ISMS policy framework of 'Detect; Respond; Remediate; Recover' by the operational team with highest priority • perform regular penetration testing of LV Insights. • assure that data in transit and in rest are encrypted • optionally enable multifactor authentication for User Interface (UI) access via customer's IDP
Updates	Siemens makes reasonable efforts to keep all customers on the latest available product release. Siemens will • apply operating system and other third-party security patches and updates as appropriate. • apply application software patches as necessary and perform periodic upgrades with latest application software releases (usually two upgrade releases a year). • maintain and troubleshoot third party software issues required for ongoing operations, work with third party provides to troubleshoot as required. • notify its customers of release schedule and availability of new upgrades, patches and service releases in a regular fashion. The schedule for installation will be mutually agreed upon. Customer has the obligation to approve and enable updates for the latest supported version within 6 months after release of the new version or until a mutually agreed date. Otherwise, Siemens may suspend product support and operations.

Monitoring and Maintenance	Siemens will • administer and monitor environments including utilization of Central Processing Unit (CPU), memory, Input/Output Operations (IOPs) and disk space • administer and maintain associated operating systems • manage and troubleshoot the infrastructure components and processes, software licenses and maintenance • develop, maintain and utilize standard operations procedures and daily checklists for Siemens operators and administrators
Testing Environment	Siemens uses a system for testing purposes that may be integrated with Customer's systems for delivery and testing of updates before deployment in production environment. The testing environment does not adhere to the SLAs.
Data Retention	Siemens will provide • One (1) month of hot storage • Up to one (1) year of cold storage • Upon termination data archival of data for up to three (3) months to permit transfer to customer
Training	Siemens will provide • LV Insights SaaS User Guides and onboarding material • Instructor-led training (additional costs)
Onboarding	Siemens offers to the Customer to onboard LV Insights into the customer IT/OT landscape for additional fees on time and material basis and under separately agreed terms and conditions.

Packages

Overview	The packages in the table below have limits that apply for the entire Subscription Term, unless expressly indicated as "monthly" limit.

Package	Tier 1	Tier 2	Tier 3
Included SDPs	300.000	600.000	1.200.000
	Upgrade Packages		

Additional SDPs	50.000	50.000	50.000

Service Delivery Points

Service delivery point is defined as the point of delivery at which a utility service, in this case electricity, is supplied.

API Limits

Overview of services and limits levels included in the LV Insights Packages listed below:

Package	**Tier 1**	**Tier 2**	**Tier 3**
Telemetry Average Rate	25 MB/s	50 MB/s	210 MB/s
Telemetry Batch Rate (10% of the time in 12 h)	37,5 MB/s	75 MB/s	315 MB/s
Token Management	20 requests per minute	40 requests per minute	60 requests per minute

All services are protected against Denial of Services attacks that may result in temporary limiting overall requests per client.

Concurrent User Limits

The number of concurrent users is limited as follows:

Package	**Tier 1**	**Tier 2**	**Tier 3**
Concurrent User	25	50	100

Siemens Grid Software

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June 2024