



**Grid Solutions**  
a GE and Alstom joint venture

ASSET MANAGEMENT PRODUCT SOLUTIONS

# Transformer fleet management

with *e-terraassetcare*

Rationalise maintenance and replacement strategy decision-making for all your distribution and power transformers

## The flexible end-to-end solution

Transformers are critical components of your asset portfolio. Beyond their financial value, they play an even greater role in your business performance when you are exposed to many constraints. Grid Solutions helps you overcome the growing number of challenges driven by ageing assets increasing the exposure to failure and operational risks, vanishing expertise, continuous pressure on operating and capital expenses. Grid Solutions offers a suite of innovative solutions and value-added services deployed either individually or as a bundle. Health assessment of your equipment supports your decisions when managing your distribution and power transformer fleet.



### A FULLY INTEGRATED SUITE

- Field inspection and test
- Grid Solutions Mobility Suite
- Continuous online monitoring
- Oil analysis
- Analytics platform
- Strategic planning
- Expert advisory services

### COST OPTIMISATION

Our solution allows you to move from time based maintenance to a reliability centred maintenance strategy that prioritises maintenance operations and reduces your related operating costs. Optimising replacement decisions based on health and risk information will help to reduce capital expenditures.

### RELIABILITY IMPROVEMENT

From the detailed health assessment via online condition monitoring or offline testing for the most critical assets, you can anticipate and take timely actions. Thanks to early detection of incipient failures, your unscheduled outages are reduced, increasing your quality of service.

### RISK MANAGEMENT

Consistent risk evaluation is achieved by combining the probability of failure with the criticality of each transformer. Various perspectives such as cost of repair, production losses, environment, safety and operational performance impacts are also factored in. This information supports your decisions for the maintenance and replacement priorities of your transformers at fleet level.

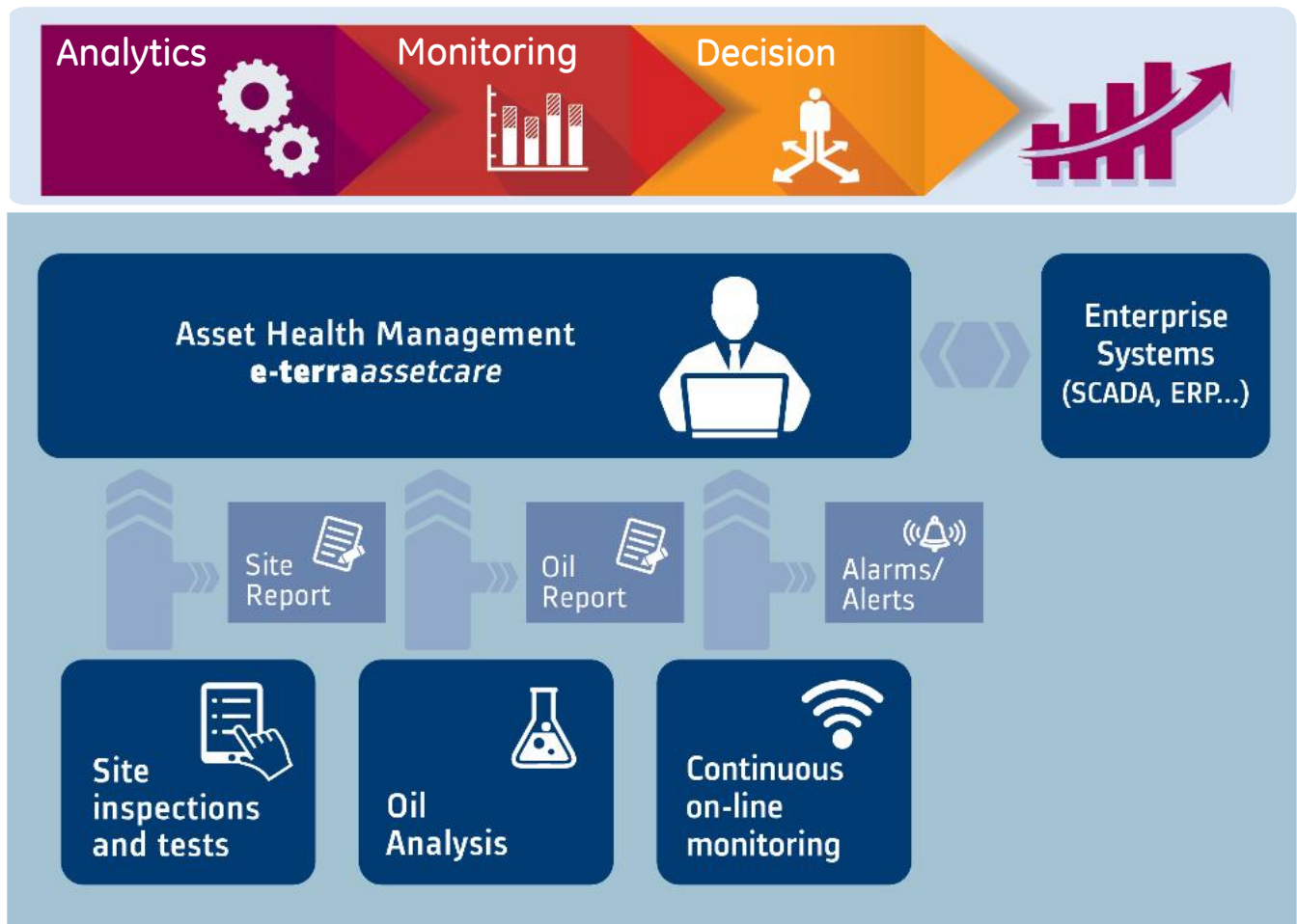
### STRATEGIC ASSET PLANNING

Our advanced analytics provide the quantified, reliable and consistent information required to establish your strategic plans and justify your investment to your regulator or shareholders (in line with the ISO 55000 standard).

Grid Solutions' fleet management offers you the best solution to optimise decision-making to maintain, refurbish or replace your transformers.



An integrated solution to get the best from your transformer fleet



#### FOR TRANSFORMER RELIABILITY AND VALUE

- Grid Solutions' expertise in transformer design, manufacturing and service
- Whole scope covered from field assessment, real time sensors, up to Enterprise IT
- Centralised repository of all kinds of data for decision support
- Expandable to all asset types with flexible health models and analytics
- Effective and consistent methodology based on industry standards
- Documented maintenance and replacement plans, integrated with your processes
- Leveraging of data from multiple sources collected online, offline, continuously or periodically via smart integration and correlation





#### SITE INSPECTIONS AND TESTS: TRANSFORMER EXPERTISE

Our field service teams carry out transformer inspections and electrical tests according to high standards which are adaptable to your practices. Our tablet-based applications streamline the field data collection process. Data is re-verified and complemented by first hand diagnostics and triggered recommendations, depending on the severity. All data is automatically uploaded to the enterprise analytics platform.



#### OIL ANALYSIS: WORLDWIDE COVERAGE WITH CERTIFIED LABORATORIES

Your oil samples are analysed by Grid Solutions laboratories or local partner. A report is generated to include remedial actions and condition severity. Data can be automatically transferred to the enterprise asset health management system, **e-terraassetcare**.



#### CONTINUOUS ONLINE MONITORING: THE CUSTOMISED SOLUTION

We can integrate all types of DGA sensors, for all ranges of transformers, regardless of age or manufacturer. Our in-house MS 3000 system can also provide exhaustive real-time monitoring of all power transformer components, including: analysis, diagnostics, prognostic and simulation features. It interfaces via multiple telemetry protocols and can connect to the **e-terraassetcare** platform to complement other inspection data.



#### ASSET HEALTH MANAGEMENT WITH **e-terraassetcare** : FLEXIBLE ANALYTICS FOR STRATEGIC DECISION SUPPORT



This central enterprise platform coordinates your business decisions.

It implements the following processes:

- Collects all available asset related data, both online and offline
- Builds analytics and actionable information (health, criticality, risk, ...)
- Monitors and triggers alerts
- Deploys diagnostic tools such as Duval triangle
- Produces comprehensive reports on the overall fleet
- Manages your digital documents

**e-terraassetcare** benefits from the world leading **e-terra** solution for network management, easing integration with other enterprise systems (SCADA, DMS, EMS, CMMS, ERP,...).



#### Expert consultancy services

Our transformer experts are actively involved at every step of the process and provide periodical analysis and support for your overall transformer fleet, in addition to condition and performance reviews. They will recommend improvements where appropriate, in line with the ISO 55000 process.

## A modular functionality

### TRANSFORMER TYPES

All oil & dry transformers used in transmission and distribution networks, as well as in industrial and power generation plants

### SITE INSPECTION USING ALSTOM ASSET INFORMATION MANAGEMENT METHODOLOGY

Visual and functional inspections of the transformer tank and equipment: cooling system, bushing, tapchanger, sensor, protection, cubicles...

### STANDARD ELECTRICAL TESTS

- Winding ratio
- Dielectric Frequency Response (DFR)
- Sweep Frequency Response Analysis (SFRA)
- Leakage reactance
- Winding and core insulation resistance
- Excitation current
- Infrared thermal imaging
- Partial discharge measurement
- Winding power factor
- Bushing power factor / capacitance test
- Bushing hot collar
- Lightning arrester dielectric loss

### DATA COLLECTION VIA ALSTOM MOBILITY SUITE

- Name plate download, verification and update
- Error-proof and efficient site data collection process: pictures, test results and comments
- Validation workflow process by expert
- Wireless automated transfer to **e-terra** *assetcare*
- Work orders, safety processes and documentation management
- Report generation

### OIL ANALYSIS

- Dissolved gas analysis on standard gases: hydrogen, carbon monoxide, carbon dioxide, methane, ethane, ethylene, acetylene
- Interpretation compliant with IEEE C57.104, IEEE C57.106 and IEC 60599
- Oil quality, dielectric breakdown voltage, furans, moisture, acidity, colour, etc
- Oil analysis automated files imported to **e-terra** *assetcare*

### CONTINUOUS ONLINE MONITORING

- Comprehensive monitoring: active part, bushings, tapchanger, cooling unit, conservator
- Advanced modeling: thermal, ageing, moisture, OLTC contact wear, cooling efficiency, etc.
- Integration of 1,3 & 8 gas DGA monitoring system
- High flexibility and modularity in monitored data, functionality and system architecture
- Protocols: MODBUS, DNP3, IEC 101, 104, 61850, ..
- Web server for remote User Interface

### ASSET HEALTH MANAGEMENT WITH **e-terra** *assetcare*

- Health index, maintenance index
- Criticality, probability of failure, risk
- Diagnostics and remedial measures
- Event monitoring
- Action tracking and job management
- Telemetry protocols: IEC 101/104, DNP3, Modbus, IEC 61850, OPC, ICCP, ELCOM
- 3-tiered architecture fully virtualisable
- Web service interface with enterprise IT systems for CIM-based communications
- Flexible ETL interface with external systems
- Thin-user interface client (HTML 5)
- Alerts notification by SMS or email
- Standard and customisable reports

For more information please contact  
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#### Worldwide Contact Center

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