LEONARDO CYBER & SECURITY SOLUTIONS

EMODS

ENERGY MANAGEMENT OPTIMIZATION & DECISION SUPPORT

Energy Efficiency

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Worldwide policies are calling Public Administrations, Utilities and Industries to pursue a smart energy usage for emission and costs reduction. These actors are asked to identify and realize interventions in order to promote and increase energy performance of their infrastructures and to enhance energy efficiency.

In such a context, Governments and Critical National Infrastructures have an increasing need of solutions and services not only to achieve the targets established by national and international laws, but also to reach complementary advantages such as lower energy bills that can be obtained through custom energetic behaviour analysis and consequent suggestion of best practices. An effective energetic management of plants, sites and even districts, cities or regions is based on the availability of related information, appropriate measures for corrective interventions, forecasting capacities, a deep knowledge of the available tariffs and of the energetic market, centralized procedures and invoicing controls. To achieve these goals, a complete platform for the improvement of energy efficiency has to offer:

- the analysis of real time energy consumption and of energy performance trends,
- forecasting functionalities,
- deviation verification from Consumptions Typical Curve,
- evaluation of services' levels as a consequence of modified energy profiles and decision support,
- monitoring of efficiency events in order to highlight the improvements achieved in terms of consumption and costs.

THE ENERGY EFFICIENCY SOLUTION

Leveraging on modelling and simulation techniques and Big Data, Analytics and IoT technologies, Leonardo's energy efficiency solution is a platform addressing the management of energetic monitoring and data analysis to supply decision support facilities for energy efficiency and saving.

The cloud based energy monitoring and optimization solution acquires and correlates data from devices and high energy consumption equipment to offer analysis functions useful for the definition of immediate efficiency actions to reduce both current consumptions and those referred to high activity periods.

The **Energy Management Optimization & Decision Support (EMODS)** solution allows the development of an Energy Community in which every stakeholder is advised about the current situation, the achieved results and the future goals to be realized though the usage of summary reports, also generated in real time, and automatic alarms that can be shared through different channels like emails, social networks or others.

The dashboards and reports produced by the EMODS solution allow our customers to have a deep knowledge of their consumptions through a complete view on the energy usage for all their processes and represent the basis for the production of the guidelines aiming at the reduction of consumptions and costs.

EMODS helps the energy managers to identify the best practices deriving from the analysis of historical data of the analysed sites and allows the definition of the needed strategies for an optimal energy management.

Data describing auto-production from both renewable and not-renewable sources are integrated into consumption analysis features to indicate the necessity to start or to stop auto-production in order to cope with unexpected consumption peaks.

CYBER SECURITY

As cyber threat related to energy and electricity sector is growing targeting both IT and OT sectors, Leonardo leverages its cyber security capabilities to build an integrated and specific approach addressing the issues of both energy management and cybernetic resilience.

Network protection, security monitoring and analytics functionalities are introduced to support the safety of IT and industrial protocols, to identify anomalies or attacks, to detect known behaviours using rules based on Indicators of Compromise, to identify predictive models on methods or unknown vectors of attack and to signal security events to be analysed.

THE ENERGY EFFICIENCY MODEL

Leonardo's approach to energy efficiency and optimization is based on a model in four steps that addresses consumptions' optimization and costs' reduction. At first, the model is applied to the buildings or sites more energy consuming and is subsequently employed on the most representative real estate assets of the Customer.

The proposed model aims at the identification of interventions addressing the realization of an energy saving project that, starting from introduction of devices for the acquisition of energy usage data, allows the analysis of historical data of both consumptions and costs.

- **Assessment:** the knowledge of the customer's energy consumption profiles is at the basis of all the needed activities for the energy management process and allows the identification of the most suitable energy contracts for the customers and the detection of the higher consumptions in order to anticipate the remediation actions for energy savings purposes. The aggregation of similar consumption profiles or geographical zones into clusters allows the identification of the best contracts to be applied to the different groups of consumers.

- **Monitoring:** the system, through the processing of the acquired data – energy users, consumption profiles, clusters' definition – and the correlation with external variables – i.e. whether data, production processes, etc – is able to produce synoptic and reports containing the information required to monitor energy consumptions, to manage the data entry into analysis scenarios, to present the information related to defects, to define rules, thresholds and alarms and to present the costs related to energy supply and its historical trends.

- **Energy Efficiency Interventions:** EMODS is able to build simplified models in order to analyse the functioning mode of the single sites as well as reference models that represent the consumptions trends and CO2 emissions. The usage of the EMODS platform and energetic consumption audits enables the analysis of the sites' load profile to identify non-optimal energy consumption practices, anomalies and wastes. This information allows the production of various types of proposed interventions arranged by different levels of costs to be sustained for their realization. The optimization scheme managed by EMODS aims at achieving a reduction of consumptions and at the same time maintaining the same service levels trying to flatten the energetic load curve and allowing better negotiation in supply contracts.

- **Management and decision support:** the synergic usage of the historical consumption data, the energetic model of the analysed structure, a simulation engine, the synthesis and detailed reports and graphical views, the statistical analysis and a forecast model for consumption prediction make available to Decision Makers all the needed functionalities to solve complex issues and to have a prompt response following unexpected situations. The analytical functionalities of the decision support system take advantage of advanced algorithms that are applied to the consumptions of the whole infrastructure or of the logical or physical clusters defined by the user. A collection of user defined KPIs are generated to enhance the Decision Makers ability to make objective, data driven decisions.

FUNCTIONALITIES

Leonardo's EMODS enables the monitoring of energy data in order to analyse, optimise and limit energy consumption and costs though the following functions:

- **Real-time monitoring** to control overall and punctual consumption for energy saving measures and energy purchasing management;
- **Consumption clustering** to model and monitor areas (clusters) with homogeneous characteristics;
- **Consumption analysis and forecasting** to analyse the measured data against the previous year's profile information and the expected forecast, processed using Machine Learning algorithms;
- **Verification of deviations** to determine the presence of anomalies within a consumption curve through the use of Machine Learning algorithms (e.g. Peak & Valley Detection, Anomaly Detection) or through the comparison between the real consumption curve and the Typical Consumption Curve;

ASSESSMENT	MONITORING	ENERGY EFFICIENCY INTERVENTIONS	MANAGEMENT AND DECISION SUPPORT
Analysis of consumption data and current energy contracts	Definition of the energy profiles	Execution of energy efficiency interventions	Optimization and management

ENERGY MANAGEMENT SYSTEM

- **Billing verification** to check invoices and perform economic analysis;
- **Decision support** to help the Energy Manager and operators through information contained in operational reports (Load Curve and KPI Analysis) and specific tools;
- **Bill Simulation** to calculate the bill starting from available monthly consumption data (from the distributor and the supplier) and from the costs defined in the Supply Contract.
- **Efficiency Events Report** management to record efficiency events and specific data, such as start and end date or intervention's costs, compare consumption curves before and after efficiency measures and highlight the improvements achieved in terms of consumption and costs;
- **Load management** to support operators of distributed generation sites while planning the use of self generation and storage in order to modify the consumption curve in response to future energy demand of the monitored site;
- **BMS integration** to interface with BMS systems installed on the monitored site in order to allow users to set high-level (energy and/or economic) optimisation logics for the controlled variables (e.g. lighting and room temperature, etc.) and to send the commands for the implementation of these logics through a programmable scheduling system.

BENEFITS

- Intervention opportunities identification for energy behaviour enhancement and costs optimization

- Unnecessary, unexpected or unjustified consumption identification and removal

- Consumptions continuous monitoring and real time anomaly detection

- Gaps identification through different contracts application to consumptions curve

- Critical events simulation and identification in order to provide the operator with possible solutions and remedies

- Energy saving campaigns and policies monitoring in order to measure their benefits.

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