N-SIDE

navitasoft

Sandrologic Group

Energy Market Management Platform for Moldelectrica

Item 8 - Detailed description of the implementation process of the proposed solution

April 10th, 2026

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1 | Introduction

This document describes how the Consortium composed of N-SIDE and Navitasoft, and the local partner Sandrologic, will implement the Energy Market Management Platform (MMS) for Moldelectrica, ensuring alignment with all the technical specifications, regulatory context, and operational requirements defined in the tender.

The implementation of the Market Management System represents a strategic milestone for Moldelectrica, supporting the modernization of Moldova's electricity market and its progressive alignment with European market design principles and ENTSO-E requirements. The Consortium fully recognizes the operational criticality of this platform and the need for a robust, secure, and reliable system capable of supporting market operations under strict availability and integrity constraints.

The proposed approach is based on proven methodologies and best practices derived from previous implementations of market management systems for transmission system operators across Europe. It combines strong project governance, clear accountability, incremental validation through structured testing phases, and close collaboration with Moldelectrica's teams to ensure a smooth transition toward operational use.

The present proposal is structured as follows:

- **Section 2** presents our understanding of the challenges and the strategic context of the project.
- **Section 3** describes the Consortium organization and governance model.
- **Section 4** details the proposed solution and its alignment with business and non-functional requirements.
- **Section 5** outlines the implementation approach and delivery methodology.
- **Section 6** presents the project management framework, including risk, quality, and change management.
- **Section 7** describes the knowledge transfer framework and training strategy.
- **Section 8** explains the services provided after the go-live (i.e. support and maintenance).

2 | Our understanding of the challenges

Moldelectrica stands at a pivotal moment in its history. Following your certification as an Independent System Operator (ISO) in July 2023, the deployment of a new Market Management System (MMS) is a critical step in modernizing Moldova's energy sector. We understand that this project is not just an IT implementation; it is a strategic enabler for strengthening Moldova's energy security, increasing renewable energy integration, and facilitating domestic power generation.

Based on our analysis of the technical specifications, we have identified the core market and regulatory challenges that Moldelectrica must navigate during this transition:

- **Navigating EU Integration and Regional Market Complexity:** The transition towards the European target model for electricity wholesale markets and full ENTSO-E membership is a highly complex regulatory and operational undertaking. Moldelectrica must navigate a unique geopolitical and regional context, which brings specific market challenges:
- **Seamless Cross-Border Coordination:** The MMS must integrate smoothly with current and future allocation platforms. This requires flawless coordination with your neighbouring TSOs, Ukrenergo (Ukraine) and Transelectrica (Romania), while simultaneously preparing for future integration with the Joint Allocation Office (JAO).
- **Methodological Transitions:** The system must not only support your current NTC-based capacity calculations but also be entirely future-proofed to handle the planned shift to a flow-based methodology by 2028, as well as the transition to coordinated capacity calculation (CCC).
- **European Balancing Platforms:** Moldova's integration into European balancing markets requires strict adherence to ENTSO-E standards. The MMS must be capable of establishing seamless, automated data exchanges with European platforms, specifically PICASSO for aFRR and MARI for mFRR.
- **Local Market Specificities:** While aligning with European standards, the MMS must also adeptly handle unique local operational requirements. A prime example is the need to support the in-kind compensation mechanism and the specialized compensation scheduling for the Transnistrian region.

3 | Consortium organization

3.1 | Consortium overview

The project will be delivered through a Consortium model (N-SIDE and Navitasoft) with the addition of a local partner (Sandrologic), which we consider the most effective approach for an initiative of this complexity and strategic importance. Those three entities bring together complementary expertise in European balancing markets systems, market management systems implementation, system integration, infrastructure delivery, regulatory-aligned implementations, and knowledge of the Moldova's regional market. By combining specialized capabilities from each partner (as detailed in the table below), the solution benefits from deep functional market knowledge, good understanding of the Moldavian market specificities, strong technical architecture and integration skills, and solid operational and infrastructure support. All assigned resources have proven experience in similar projects and a strong understanding of electricity market operations and system integration challenges.

From a governance perspective, the contract will be executed under a formal Consortium structure between N-SIDE and Navitasoft, with Sandrologic as subcontractor. Navitasoft will act as the Project Management lead and single point of coordination for day-to-day execution, planning, and reporting. However, legally, the project is delivered by the Consortium as a whole, with each partner responsible for its designated scope of work and accountable for its respective deliverables.

	N-SIDE	Navitasoft	Sandrologic
Areas of expertise	European balancing markets; Regulatory compliance; Advanced analytics and mathematical optimization	Delivery and Support of Large scale, EU compliant end to end Energy Market Management Systems; Project Management & Agile Delivery;	Local presence; Moldovia electric market knowledge; System integration;
Roles during the Integration Project	• Contract Management • Design, implementation and testing of the following functionalities:	• Project Management • Technical lead • Design, implementation and testing of the following	• Account Management / Local Partner • Design, implementation and testing of the reporting module

	auctions (including balancing market capacity, balancing market energy, procurement of grid losses), cross-border capacity management, optimization engine	functionalities: gateway, master data, scheduling, reserve capacity management, mFFR activation, balancing, settlement, publication, formula editor, user management, roles and permission management, logging, data warehouse, messenger, user interfaces • Documentation • Training • Infrastructure setup • Build, packaging, installation and deployment • Infrastructure resilience and disaster recovery • Go-live preparation	• System integration • Hardware installation and setup • Infrastructure software & licenses provision
Roles during the Free Warranty, Support & Maintenance	3rd-line support Maintenance	Service Management 2nd-line support 3rd-line support Service desk provision Maintenance Release Management Change Management	3rd-line support Maintenance

3.2 | N-SIDE presentation

N-SIDE is an independent company specialized in innovative decision-support solutions based on state-of-the-art advanced analytics, optimization techniques, and quantitative modelling. By combining deep industry knowledge with strong analytical capabilities, our team of consultants, engineers, and data scientists enables organizations across the energy value chain to make informed strategic, tactical, and operational decisions in complex and evolving market environments.

Founded in 2000 as a spin-off from Université Catholique de Louvain (UCLouvain) in Belgium by Prof. Dr. Philippe Chevalier, N-SIDE has grown into an international company employing more than 220 engineers, business experts, and data analytics specialists. We develop high-performance software solutions and deliver tailored consulting services to leading organizations in the Life Sciences and Energy sectors, supporting mission-critical processes with robust and scalable technologies.

Within the energy domain, N-SIDE has developed recognized expertise in the design, modelling, and optimization of electricity markets, notably through the development of Euphemia, the algorithm used for the coupling of European day-ahead markets. By combining in-depth knowledge of power system operations, balancing market mechanisms, and advanced optimization methods, N-SIDE has established strong collaborations with several European Transmission System Operators and market operators. These collaborations include consulting assignments, proof-of-concept developments, analytical studies, and the delivery of operational decision-support tools. Backed by a strong software engineering and operations team, N-SIDE has demonstrated its capability to deliver production-grade solutions operating in live environments under stringent availability, reliability, and performance requirements.

Building on this extensive market and technical expertise, N-SIDE is pleased to support Moldelectrica in the implementation of its Market Management System. Within this project, N-SIDE will contribute its specialized knowledge in balancing markets, cross-border capacity management, grid loss procurement, and offered capacity calculation. The objective is to ensure that the implemented solution is fully aligned with European market design principles and ENTSO-E requirements, while providing a robust, reliable, and operationally effective platform tailored to Moldelectrica's needs.
Given the combination of these factors, N-SIDE is glad to support Moldelectrica in this project to implement their Energy Market Management Platform.

3.3 | Navitasoft presentation

Since 2008 Navitasoft has delivered over 160 business critical energy market IT solutions across 16 countries. On a typical day we have almost 3000 users logged into our solutions.

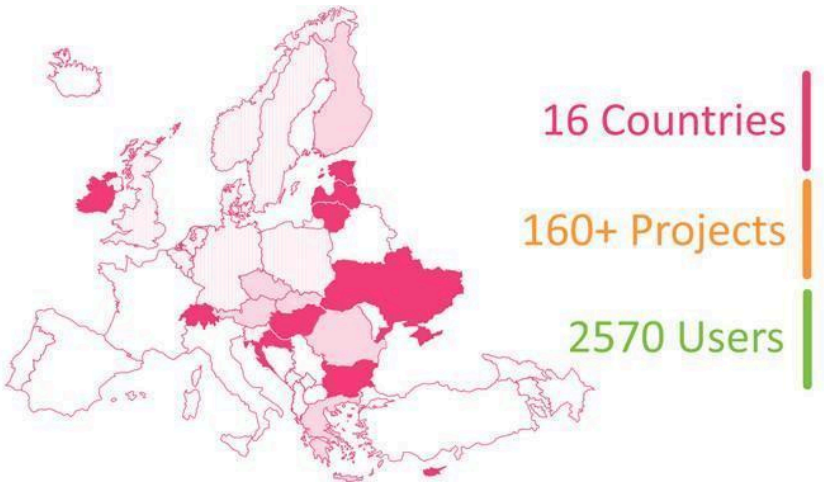


Figure 1: Navitasoft geographical coverage

We are 100% focused on energy markets. Our application customer base includes many transmission system, distribution system and market operators, as well as regulators, storage system operators, traders and retailers. With this long and broad experience we offer a deep understanding of evolving European energy markets from market design and enablement to the day-to-day practicalities of running and maintaining complex real-time solution platforms. Navitasoft continues to develop EU directive compliant IT solutions that can be flexibly adapted to local, national obligations.

Navitasoft ensures consistent on-schedule delivery of complex software solutions that meet the specified and emerging needs of our clients by employing a highly disciplined approach to the process of project specification, discovery, test driven development and deployment.

We digitalize energy by providing agile, scrum-based IT development within the PRINCE2 framework.

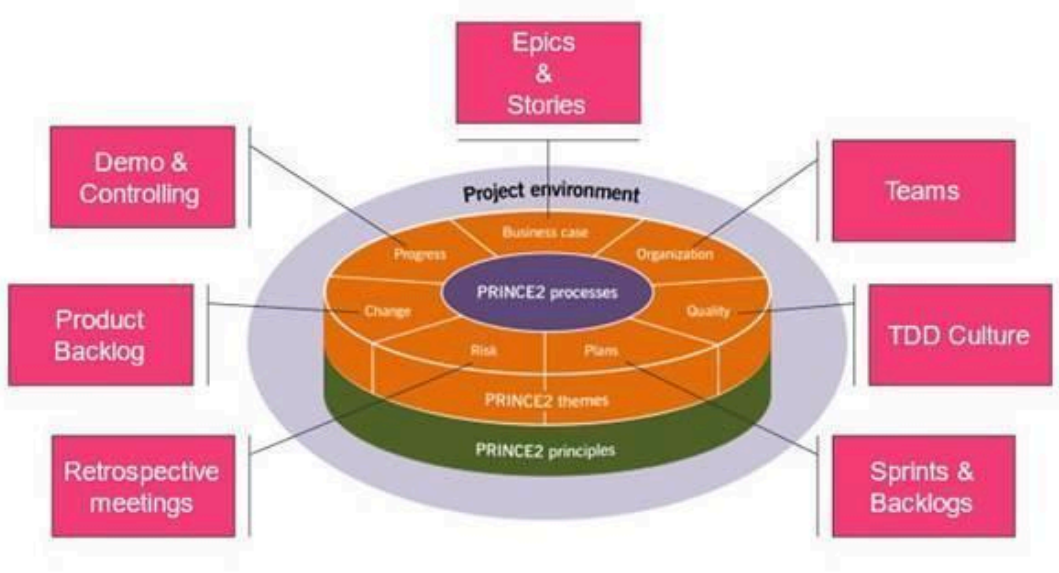


Figure 2: PRINCE2 development process

By working closely with our clients, we create detailed business and technical specification before a project begins development in the form of a granular Product Backlog, with story points for each item which we then maintain through development and deployment. This process ensures Navitasoft can accurately assess the required resources, time required, risks and costs of developing, deploying and maintaining complex solutions.

From the Product backlog we run Epics to be sure our business analysts, architects, developers and testers understand the precise business logic and functionality required. We then create stories that are translated into 2 week sprints. Each sprint is first tested internally then demoed to our client to complete the circle and guarantee that what we deliver is what the client wants. The high transparency and close cooperation with our clients this process delivers ensures the progress of a project can be effectively managed to deliver the exact solution the client needs.

This tailored, test-driven, agile development methodology enables us to adapt Navitasoft applications to new requirements in a speedy and cost-effective manner with the highest quality assurance. We keep learning to be ahead of the latest processes, software and deployment platforms to continue providing our customers with cutting edge solutions.

We have dealt with over a dozen national and EU regulatory requirements and network codes. We have mastered distance with numerous off-site

implementation projects in numerous countries and then deployed these on servers at our clients or in our data centers as well as in the cloud.

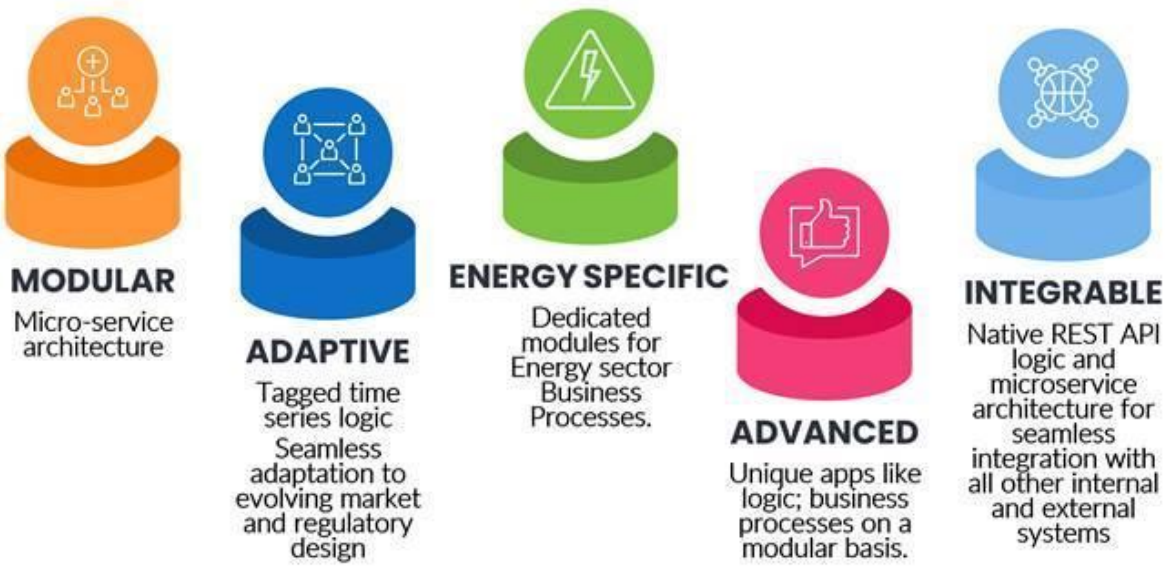


Figure 3: Key characteristics of Navitasoft solutions

We know what we are good at, and we keep doing it well. Where projects require expertise outside of our core competencies, we carefully select project partners who are equally focused and proficient in their specialty.

3.4 | Sandrologic presentation

Sandrologic Group SRL is a Moldovan IT company founded in 2006, headquartered in Chișinău, Moldova. The company specializes in system integration, on-premise infrastructure deployment, software development, and energy sector consulting. Sandrologic operates under Moldova's IT Park tax regime and serves clients across the energy, telecommunications, and public sector domains.

Sandrologic's most distinctive asset in the context of this project is its deep, firsthand knowledge of SE Moldelectrica's operational environment. Between 2006 and 2020, Sandrologic's leadership was directly involved in Moldelectrica's SCADA systems, balancing market operations, and dispatching infrastructure — accumulating over 15 years of insider experience with Moldova's transmission system operator. This knowledge encompasses Moldelectrica's existing IT/OT architecture, network topology, operational workflows, market processes, and

organizational structure, providing the Consortium with an irreplaceable local advantage.

In addition to its energy sector expertise, Sandrologic maintains active capabilities in enterprise infrastructure technologies including Proxmox VE virtualization, Linux and Windows Server environments, Microsoft SQL Server, and API-based system integration. The company has hands-on experience deploying and commissioning on-premise environments for mission-critical operational systems and is familiar with the LF Energy open-source ecosystem relevant to modern energy platforms.

Within this project, Sandrologic serves in three complementary roles. As Local Partner, Sandrologic provides stakeholder coordination, local regulatory knowledge, and on-site presence throughout the implementation lifecycle. As Infrastructure Provider, Sandrologic is responsible for supporting the procurement, delivering, installing, and commissioning the full hardware infrastructure across Moldelectrica's two data center locations. As System Integrator, Sandrologic leads the technical integration of the MMS with Moldelectrica's external operational systems — MDMS, ERP, and EMS/SCADA — and develops the local reporting module fulfilling all regulatory reporting obligations toward Moldovan authorities.

Sandrologic's combination of deep local knowledge, infrastructure expertise, and system integration capabilities makes it a critical enabler of this project's successful delivery and long-term operational stability.

4 | Our solution

This section presents our proposed solution and its different modules, detailing the overall architecture, its alignment with Moldelectrica's business requirements, and its compliance with all non-functional requirements.

Our solution has been carefully designed to **fully address all requirements specified by Moldelectrica, without exception**. Each component, integration point, and technical choice directly responds to the functional expectations, performance targets, security constraints, and operational standards outlined in the tender documentation.

The following subsections provide a structured view of the solution architecture and clearly demonstrate how every requirement has been comprehensively and systematically fulfilled.

4.1 | Architecture

4.1.1 | Overview

This section will be finalized with Moldelectrica during the design phase at the beginning of the project as we gain a deeper understanding of their needs and existing infrastructure.

The solution utilizes hypervisor-based servers infrastructure consolidating multiple applications.

The infrastructure is run on two distinct Data Centers.

Applications run in virtualization, using container technology with Kubernetes Orchestrator.

The operating system of choice is Linux, but Windows Server licenses are also required for MS SQL server.

The network infrastructure, as well as the storage network, must be provided by Moldelectrica. In case of two data centers, network connectivity plays a critical role in ensuring seamless operation and communication between the sites.

For the application and Kubernetes layer, the storage system must support a compatible storage class provisioner, for which Network File System (NFS) will be used.

The Section 4.1 | Architecture of this document covers the requirements from chapter 2.1 (System-level requirements) and 2.2 (Minimum architecture requirements) of the technical specification document.

4.1.2 | Hardware and software environment

The following figure shows the high-level architecture of the MMS solution:

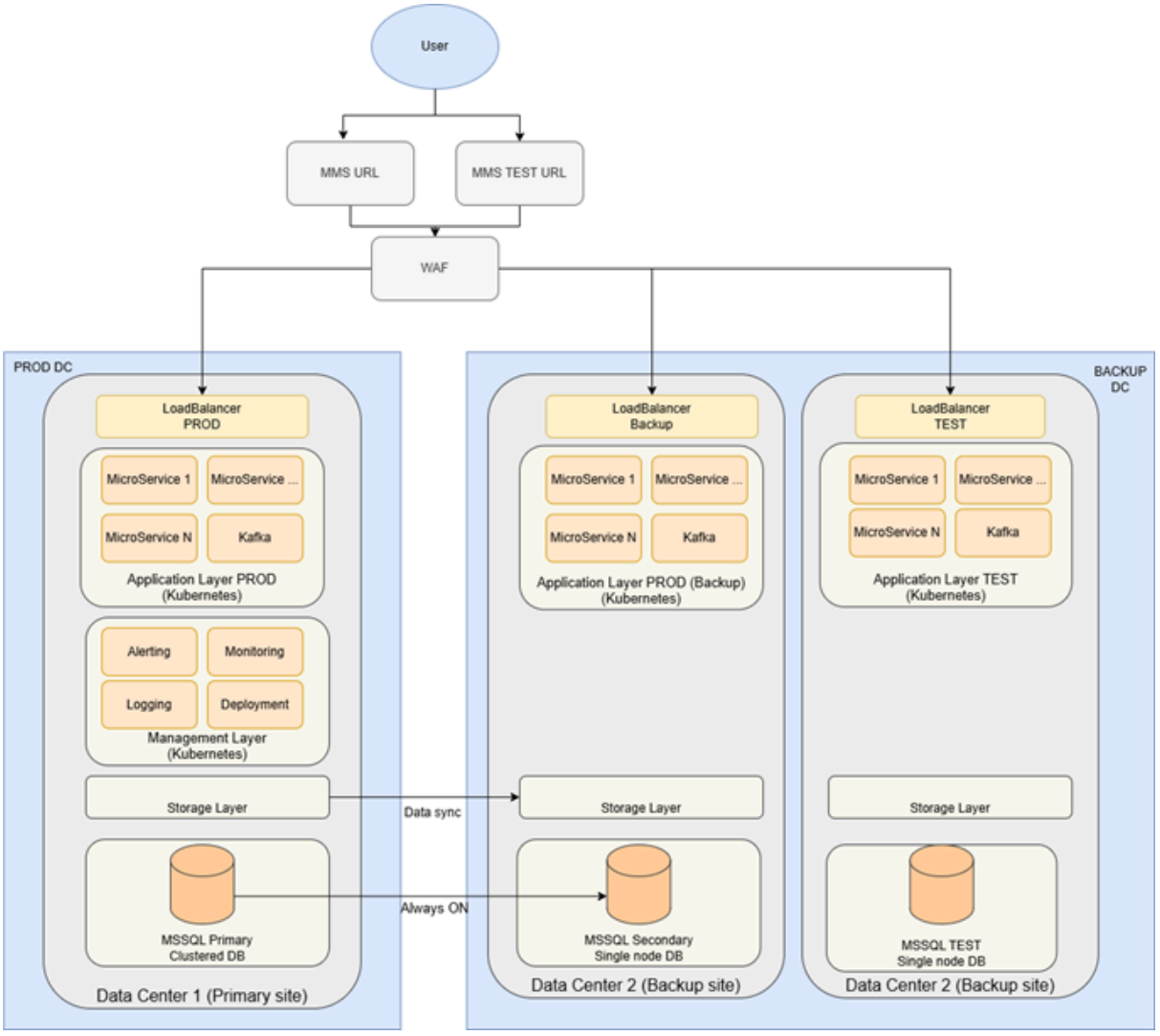


Figure 4: High level architecture

The next figure shows the structure of the VM instances, and the layers within:

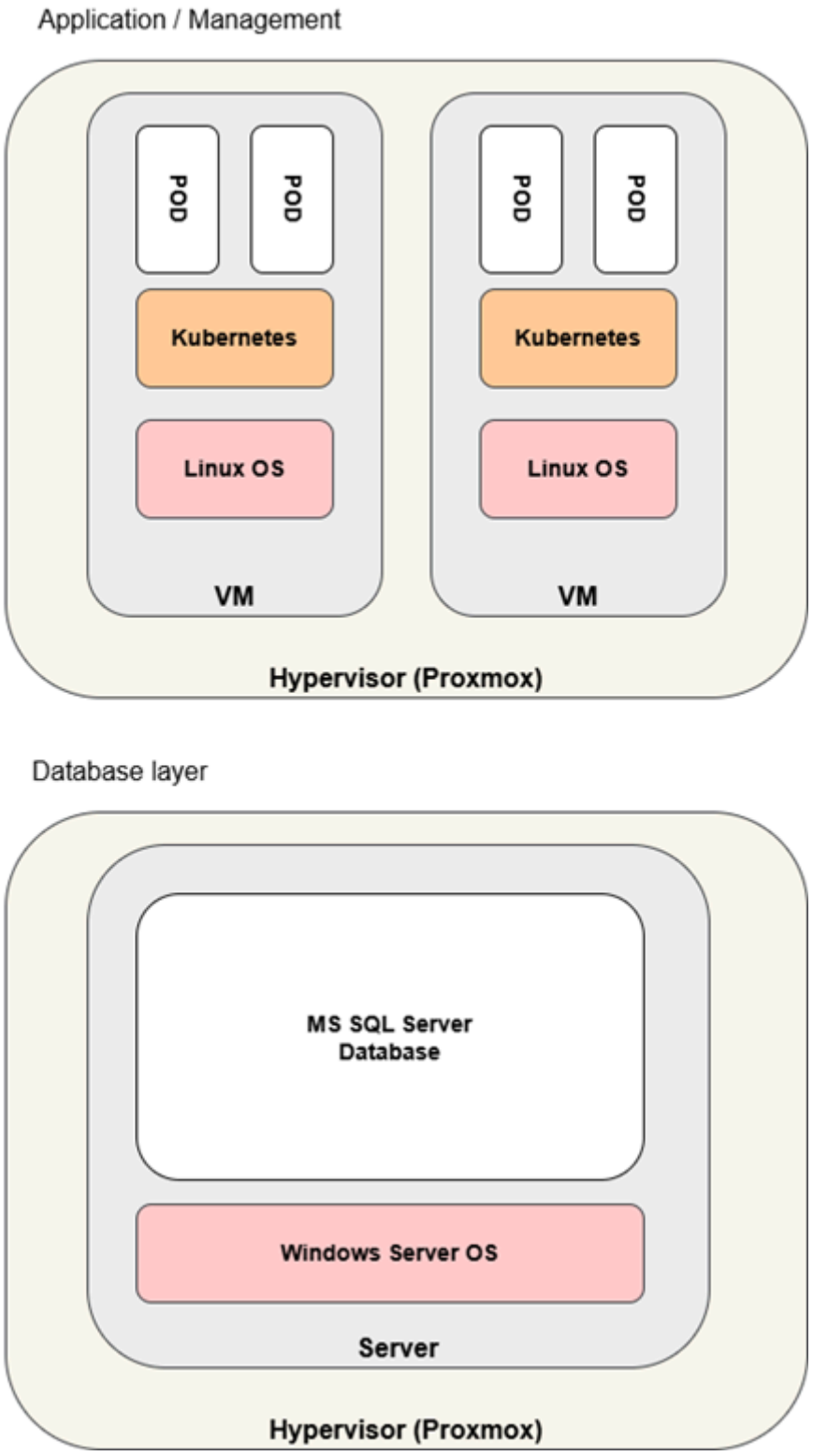


Figure 5: Server structure

4.1.2.1 | Application layer VM structure

Servers, which are responsible for the application layer, utilize the following components:

4.1.2.1.1 | Hypervisor

A hypervisor, also known as a virtual machine monitor (VMM), is software, firmware, or hardware that creates and runs virtual machines (VMs). It allows multiple operating systems to share a single hardware host, with each OS running in its own isolated environment. Hypervisor will be initialized by Moldelectrica (and configured by the Consortium – as this is up to discussion in the design phase of the project). As the solution is compatible with all major Hypervisor vendors, The Consortium recommends using the existing hypervisor technology which is already in use by Moldelectrica – in this case Proxmox.

4.1.2.1.2 | VM with Linux OS

A virtual machine (VM) is an isolated software environment that emulates a complete computer system on shared physical hardware, enabling multiple systems to run securely and efficiently on a Proxmox hypervisor. Within this setup, each VM operates a Linux-based operating system—either Ubuntu or Debian—providing a stable, well-supported platform for applications while maintaining full separation between workloads.

4.1.2.1.3 | Kubernetes

Kubernetes is an open-source platform designed to automate the deployment, scaling, and management of containerized applications. It provides a resilient, self-healing infrastructure that ensures high availability and efficient resource utilization across distributed environments. With strong ecosystem support and proven industry adoption, Kubernetes enables organizations to operate modern, scalable, and cloud-agnostic application workloads

4.1.2.2 | Database

This section covers the requirements from chapter 2.4 (Data management requirements) of the technical specification document, including:

- 2.4.1 General requirements
- 2.4.4 Data Integrity
- 2.4.5 Archiving
- 2.4.6 Back-ups

4.1.2.2.1 | Database VM structure

Microsoft SQL Server is the preferred database distribution.

The database server VM structure could be the following in a virtualized environment:

1. Hypervisor
2. Windows Server
3. MS SQL Server

4.1.2.2.2 | Database architecture

Microsoft SQL Server offers a range of high availability and disaster recovery (HADR) solutions to ensure continuous availability and efficient data management.

SQL Server Always On Availability Groups provide high availability and load balancing by allowing multiple replicas of a database to be created. These replicas can be distributed across different servers and data centers, ensuring continuous availability and load distribution. Always On Availability Groups also support disaster recovery by enabling the creation of secondary replicas in different geographic locations. These replicas can be configured for automatic failover in case the primary replica fails, ensuring business continuity.

SQL Server Failover Cluster Instances (FCI) provide high availability at the instance level by using Windows Server Failover Clustering (WSFC). This setup ensures that if one node fails, another node can take over with minimal downtime.

SQL Server Backup and Restore features allow comprehensive backup strategies, including full, differential, and transaction log backups. The production system itself can retain a large volume of data, covering 3 or more years of operation.

For optimal performance, SQL Server HADR solutions typically require high-performance hardware, including identical server hardware for each node and a Storage Area Network (SAN) for shared storage. SQL Server can run on both Windows and Linux, providing flexibility in deployment.

4.1.2.2.3 | Archiving

Wherever appropriate, large transactional tables will be partitioned by date to support efficient data management. After the defined retention period expires, older partitions can be cleanly detached or removed from the live system, allowing the data to be archived according to organizational policy. This

approach ensures optimal query performance on current data while maintaining compliance with long-term storage requirements.

4.1.2.2.4 | Backup strategy

Daily backups will be performed using the native Microsoft SQL Server backup mechanisms. This includes full database backups executed on a nightly schedule, with the option to introduce differential or transaction log backups if required by retention or recovery-time objectives. Backup files will be stored in a secure location designated by Moldelectrica's IT policies, ensuring that the system can be reliably restored in case of failure or data loss.

4.1.2.2.5 | Data integrity

The solution uses a relational database as the sole system of record and enforces ACID transactions to guarantee atomicity and consistency of all data changes. Declarative integrity is implemented through strict schema constraints—especially foreign keys, unique constraints, and not-null checks—supplemented by procedural validations where required. Referential integrity checks are executed on every insert, update, and deactivate operation; any transaction violating constraints is rejected/rolled back and the details are written to a dedicated integrity log for review and audit. This ensures there are no orphaned or invalid references and prevents database corruption.

4.1.2.2.6 | Auditing capabilities

All data processed by the solution is strictly audited to ensure full traceability of configuration changes, user inputs, and UI-driven modifications. Auditing is enforced at the database level through a trigger-based mechanism provided by the Contractor (Data History Manager), which captures all relevant changes and stores them in dedicated audit structures wherever necessary on top of the core database schema. This mechanism is proven in production at multiple client-sites and ensures reliable historical tracking without impacting primary system performance.

4.1.2.3 | System availability

This section covers the requirements from chapter 2.5 (System Availability/reliability requirements) of the technical specification document.

The proposed solution architecture fully supports the required high-availability and redundancy expectations across all system layers. The primary production site (Datacenter 1) hosts the Kubernetes-based application environment with

built-in HA capabilities, and the Microsoft SQL Server database layer operating in a clustered, highly available configuration as described in the database architecture chapter. A geographically separate backup site (Datacenter 2) provides a warm standby environment, featuring an independent Kubernetes installation, a single-node Microsoft SQL Server instance synchronized with the primary via Always On, and synchronized NFS storage. A WAF is deployed in front of all services to route traffic based on site availability, ensuring controlled active–passive operation between datacenters. All required failover, fallback, and fall-forward measures—including site failover, database synchronization, and service continuity within the specified downtime limits—will be fully supported by this architecture.

4.1.3 | Architecture description

4.1.3.1 | Technical architecture overview

The following figure shows the main components of the MMS solution architecture:

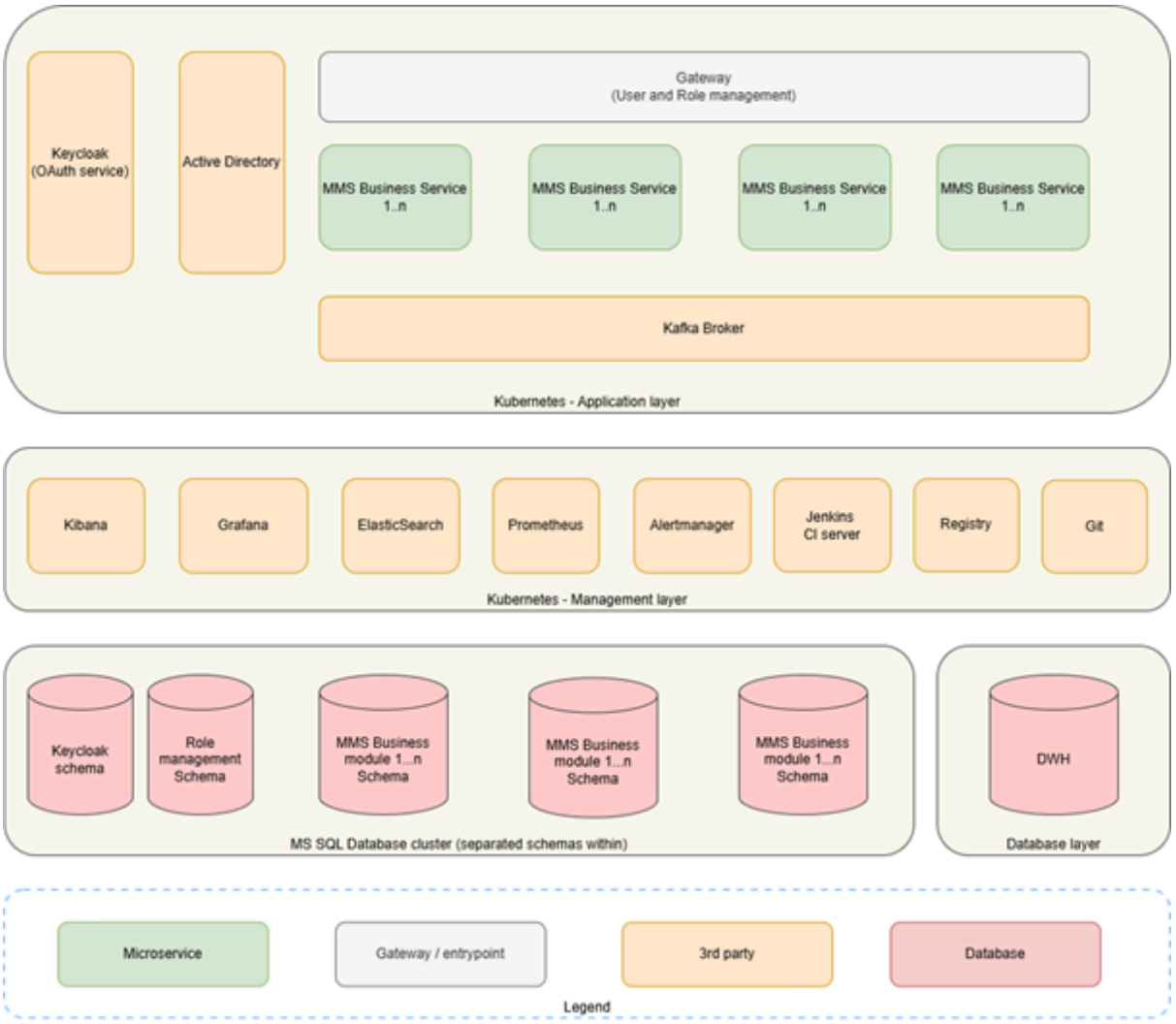


Figure 6: MMS architecture components

4.1.3.1 | Component description

4.1.3.1.1 | Keycloak and Active Directory

Keycloak is an open-source Identity and Access Management (IAM) solution developed by Red Hat. It provides features like single sign-on (SSO), user federation, strong authentication, and fine-grained authorization. Keycloak supports various protocols such as OpenID Connect, OAuth 2.0, and SAML 2.0, making it versatile for modern applications. Additionally, it offers a web-based admin console for easy configuration and management.

Keycloak offers two-factor authentication (2FA) to enhance the security of user accounts by requiring an additional verification step beyond just a password. When 2FA is enabled in Keycloak, users must provide a second form of

authentication, typically a one-time passcode (OTP) generated by an authenticator app like Google Authenticator.

Keycloak will be integrated with Active Directory.

The solution includes the deployment and configuration of a secure, Microsoft Active Directory–based on-premises identity and access management environment. The delivered Active Directory infrastructure will provide centralized authentication, authorization, and policy enforcement for all integrated systems and user accounts. The implementation ensures high availability, compliance with security best practices, and seamless integration with the overall IT architecture.

4.1.3.1.2 | Gateway

The solution incorporates a centralized Gateway Service that serves as the single secure entry point for all incoming requests. The gateway proxies and routes traffic to backend services while applying unified access and routing policies. It integrates with Keycloak to perform authentication, role-based authorization, and full session management. This approach ensures centralized security governance, streamlined integrations, and scalable handling of client requests across the system.

4.1.3.1.3 | Microservices

This section covers the requirements from chapter 2.7 (User interface requirements) of the technical specification document, including:

- 2.7.1 General UI requirements
- 2.7.3 UI Architecture

4.1.3.1.3.1 | General architecture

Each business module (microservice) includes its own user interface, application logic, and dedicated database schema, ensuring clean separation of concerns and maintainability. Every module provides its own set of Operator and Market Participant (MP) UIs and functions, with strict role-based separation enforced at the gateway and service level. While these UIs appear as a unified structure in the gateway's menu, they remain logically and technically isolated within their respective modules. Organizing functionality around business processes—rather than splitting modules by Operator vs. MP roles—results in a more coherent system, as both user groups frequently undergo functional changes driven by

business evolution. This approach improves release management, reduces cross-module impact, and supports faster, more predictable updates.

4.1.3.1.3.2 | Frontend

The frontend of every module is a rich internet application (or single page application) written in Angular. Angular is a popular open-source framework created by Google for developing web applications. It's built on TypeScript and uses a component-based architecture and includes a collection of well-integrated libraries that cover a wide variety of features, including routing, forms management, and client-server communication.

The frontend communicates with the backend via REST interface.

4.1.3.1.3.3 | Backend

The backend architecture of the microservice-based system is designed with a focus on modularity, scalability, and efficient data management. A general overview of the backend architecture is:

- **Spring framework and Spring Boot:** Utilized as the primary framework for building microservices. Spring Boot is an industry-standard framework known for its robustness, security, and modern development practices. It simplifies the setup and development process with its "convention over configuration" principle. Spring Boot also integrates seamlessly with cloud platforms and supports modern practices such as reactive programming and cloud-native development. Its built-in security features, regular updates, and extensive community support make it a secure and cutting-edge choice. By leveraging Spring Boot, backend services benefit from a secure, scalable, and modern framework that is well-supported and continuously evolving to meet the demands of contemporary software development.
- **REST API:** Each backend service is stateless, enhancing scalability and reliability. Authentication is managed with JWT tokens ensuring secure and efficient access control.
- **Inter-Service Communication:** Services communicate either using REST API or via messaging, utilizing Kafka as message broker.
- **Database Schema:** Service-Specific Schemas: Each microservice has its own database schema, avoiding shared schemas and ensuring data isolation.
- **Timeseries Management:** Each service manages its own timeseries data using a common structure, which ensures:

- No Bottlenecks: Avoids performance bottlenecks by distributing the load.
- Data Partitioning: Natural separation and partitioning of data, enhancing performance and scalability.

This architecture ensures robust operational management and oversight, aligning with best practices for microservice-based systems.

4.1.3.1.3.4 | Authentication

Users are registered and managed within Active Directory (AD), which centralizes user management and leverages AD's robust security features. AD is integrated with Keycloak, an open-source identity and access management solution that supports OAuth2, a protocol for authorization. This integration allows Keycloak to authenticate users against AD and manage user sessions.

When a user attempts to access the gateway, they are redirected to Keycloak for authentication. Keycloak verifies the user's credentials against AD and, upon successful authentication, issues an access token (JWT). The gateway application securely stores this access token. For each REST API request to the backend microservices, the gateway includes a JWT in the Authorization header as a Bearer token. Each microservice validates the token to ensure it is valid and has not expired.

This setup ensures a secure and efficient authentication mechanism in a microservice environment. By leveraging AD for user management, Keycloak for authentication, and JWT for authorization, seamless SSO across microservices is achieved.

This section covers the requirements from chapter 2.3.1 (User Authentication) of the technical specification document.

4.1.3.1.3.5 | Authorization

The solution uses Role-Based Access Control. These roles are managed by the Role management module. Users are assigned to roles in the User – Role management module. Each service uses the group information in the token to resolve the role – which is composed of atomic permissions.

Atomic permissions, defined by the modules, are grouped together into roles in the Role management module.

This section covers the requirements from chapter 2.3.2 (User Permission & Roles) of the technical specification document.

4.1.3.1.3.6 | Data access control

Business related data (like bids, uploaded documents, etc.) are associated with a BSP or a partner. Users are also associated with the partner they represent in the User – Role management module. In addition, the system supports an 'Agent' mode, allowing a user to be associated with multiple partners. In this mode, the user can choose, at the process and market level, which partner they are acting on behalf of at any given time. Both partner accesses are included in the user's token, ensuring seamless operation across different partners. Microservice backends use this information (along with the user's permissions) to allow access only to the data which they can read or modify.

4.1.3.1.4 | Management and middleware related services

4.1.3.1.4.1 | Elasticsearch

ElasticSearch is a distributed, open-source search and analytics engine built on Apache Lucene and developed in Java. It provides near real-time search and analytics for all types of data.

4.1.3.1.4.2 | Kibana

Kibana is a user interface that allows users to visualize Elasticsearch data and navigate the Elastic Stack. It enables users to search, observe, and protect the data, analyze it, and manage and monitor the Elastic Stack.

4.1.3.1.4.3 | Prometheus

Prometheus is a free software application used for event monitoring and alerting. It records metrics in a time series database (allowing for high dimensionality) built using an HTTP pull model, with flexible queries and real-time alerting.

4.1.3.1.4.4 | Alertmanager

AlertManager handles alerts sent by client applications like the Prometheus server. It deduplicates, groups, and routes alerts to the correct receiver integrations such as email. Additionally, it manages silencing and inhibition of alerts to prevent notification overload during large-scale outages.

4.1.3.1.4.5 | Grafana

Grafana is a multi-platform, open-source analytics and interactive visualization web application. Grafana is used on top of Prometheus, to produce charts, graphs, and alerts.

4.1.3.1.4.6 | Kafka platform

Kafka Platform includes the following key components:

- **Kafka Broker:** Acts as a message broker that stores and distributes data across multiple nodes, ensuring high availability and fault tolerance.
- **Kafka UI:** Offers a web-based interface for managing and monitoring Kafka clusters, including features for topic management, schema registry integration, and real-time data flow visualization.

Kafka is used as a middleware and communication layer between microservices.

4.1.3.1.5 | Interfaces

The solution is designed with a robust set of interfaces to ensure seamless integration and interoperability with various tools and platforms. Below are the key interfaces provided by our solution.

4.1.3.1.5.1 | REST APIs

Comprehensive REST APIs are offered that are primarily consumed by frontend applications. These APIs are also available for B2B integrations and third-party tools, enabling external systems to interact with our services efficiently. The APIs support standard HTTP methods and are designed following RESTful principles, ensuring ease of use and scalability.

4.1.3.1.5.2 | Kafka integration

The solution integrates with Apache Kafka, allowing almost all data to be sent or received via Kafka topics. This integration facilitates real-time data streaming and processing, making it ideal for internal applications requiring high-throughput and low-latency data exchange. Kafka topics can be used to publish business events, logs, and other critical data, ensuring reliable and scalable communication between microservices and external systems.

4.1.3.1.6 | Operational management for MMS

4.1.3.1.6.1 | Logging

Logging will be provided by the so-called ELK/EFK stack:

- Elasticsearch – opensource search and analytics engine
- Logstash / Fluentd – a tool to collect and transfer application logs to Elasticsearch
- Kibana – A powerful user interface to query data from Elasticsearch

On top of the ELK stack, Application Performance Monitoring (APM) tool is used, which provides transaction level performance monitoring.

Please note that the (technical) Logging module – which is part of the solution – is responsible for capturing business related events. ELK stack provides low-level logging for operational purposes, while the Logging module offers high-level view for business administrators and operators.

Please note that micrometer is used for tracing among the services, which allows logs even in different services to be grouped by business processes or trace-ids. This enables operators to easily investigate complex issues which span multiple microservice.

4.1.3.1.6.2 | Monitoring

Platform monitoring will be provided by Prometheus and Grafana. These open source products have become the industry standard for modern web application monitoring. Prometheus is a metric and timeseries database – optimized for monitoring features. Grafana is a user interface for Prometheus. All application components will be monitored within Kubernetes by Prometheus. Metrics like CPU, RAM usage will be reported to the database.

Grafana lets the operators create dashboards and metrics based on data from Prometheus. The following figure shows a typical dashboard with CPU, RAM and container metrics, utilizations.

Figure 7: Grafana dashboard

4.1.3.1.6.3 | Application performance monitoring

The APM tool provides transaction-level monitoring. The APM shows transaction level data, along with external system calls, and with their respective durations.

The APM app in Kibana allows you to monitor your software services and applications in real-time; visualize detailed performance information on your services, identify and analyze errors, and monitor host-level and agent-specific metrics like JVM and Go runtime metrics.

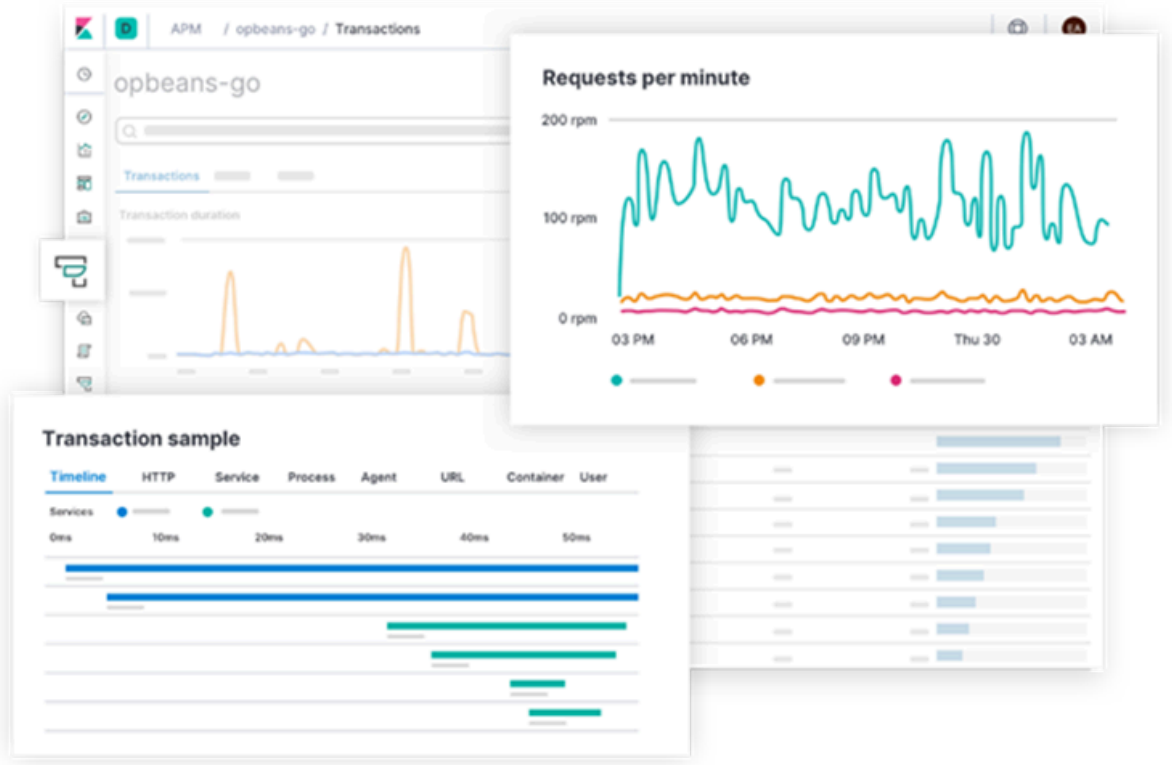


Figure 8: APM dashboard

4.1.3.1.6.3 | Alerting

Alertmanager is a component of the Prometheus monitoring stack that manages alerts by deduplicating, grouping, and routing them to the appropriate notification channels such as email. It receives alerts from Prometheus and applies user-defined rules to control how and when alerts are sent. Alertmanager also supports silencing and inhibition to reduce alert noise during maintenance or when related alerts are already active. This ensures efficient and manageable alerting in the solution.

4.1.3.1.7 | Release management

4.1.3.1.7.1 | Tools and methods

Our general release process utilizes a CI/CD server, which uses HELM charts to install the application directly into the Kubernetes cluster via Kubernetes API. Elements of Continuous Delivery can be flexibly modified. The release process supporting infrastructure elements will be provided by Moldelectrica. Therefore, deployment is provided by Jenkins and HELM.

Two different methods will be used for the different kinds of components which are managed by the Consortium.

- 3rd party components, inside Kubernetes:
  - Auxiliary services like messaging or monitoring
  - Components will be installed using the docker registry, manually
  - Occasional releases
- Application components developed by the Consortium
  - All MMS microservice modules
  - Components will be installed using the docker registry, automated process with manual approval
  - Frequent releases
  - Please refer to the next section for detailed release process description

4.1.3.1.7.2 | Release flow

The (application) deployment process is the following (this applies to all MMS modules and services):

1. Automatic build
   - Within the Consortium
   - Triggered by Git commit hook (developer pushes code into the repository)
   - Outcome: Docker image of the application
   - Steps: Application build, automatic tests, static code analysis, container build
2. Manual testing
   - Within the Consortium
   - Triggered by the application Tester(s)
   - Outcome: Go / No-go (manual test results)
   - Steps: Internal test environment deploy, manual testing process

3. Release to Moldelectrica
    - From the Consortium (Navitasoft) -> To Moldelectrica
    - Triggered by the release manager (Navitasoft)
    - Outcome
        - Docker image delivered to Moldelectrica environment
        - Required environment-specific configuration (values-uat.yaml, values-prod.yaml, values-dr.yaml)
    - Steps: either automatic or partially manual transfer depending on the VPN possibilities
4. Release to Moldelectrica environment (Prod/UAT)
    - Within Moldelectrica
    - Triggered manually by Moldelectrica release manager in Jenkins
    - Outcome: deployed application to Moldelectrica environment
    - Note: The same process applies to all environments

The following figures show the deployment process with VPN. This serves as an example and will be fine-tuned during the implementation phase, depending on the VPN type (site-to-site, client) and Moldelectrica's target infrastructure.

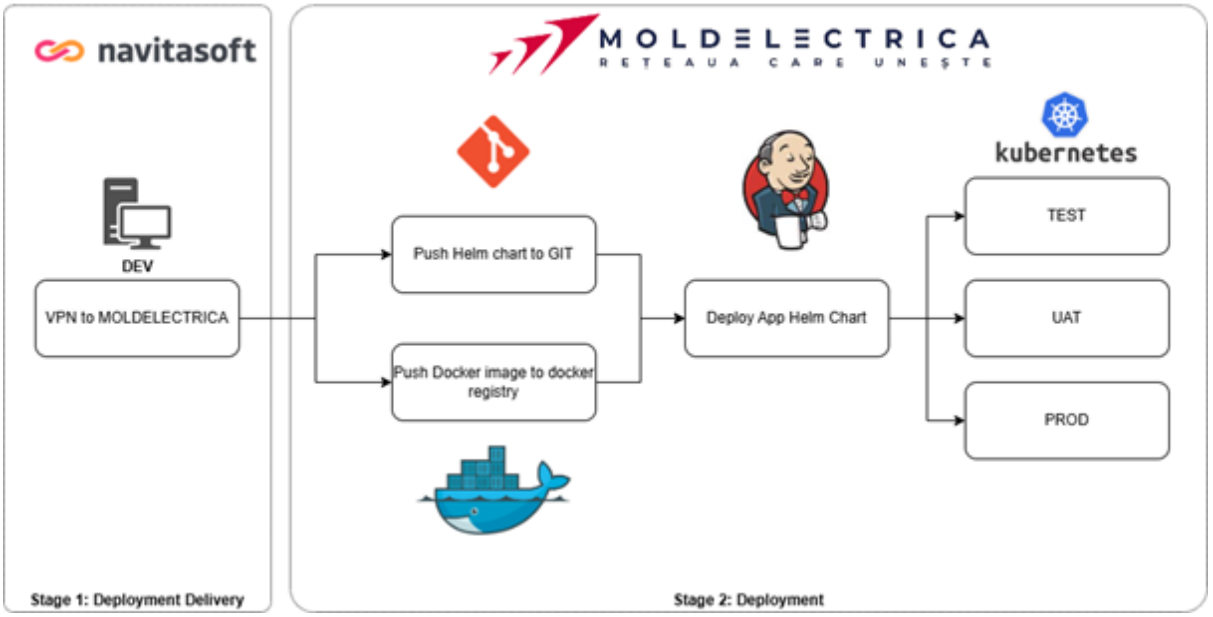


Figure 9: Release process

4.2 | Fit for business requirements

4.2.1 | System overview

The proposed Market Management System (MMS) for Moldelectrica is designed as an integrated, scalable, and modular platform that enables Moldova's full integration into the European energy market and alignment with ENTSO-E standards. The architecture is built on a common platform where specialized modules exchange data internally and interface externally with market participants, partner TSOs, and European platforms.

The system is designed to be highly automated and parameterizable. It covers all the requirements laid out in the Technical Specification and ensures that all the areas of market management are addressed.

4.2.2 | Functional architecture

The following is the functional architecture of the system:

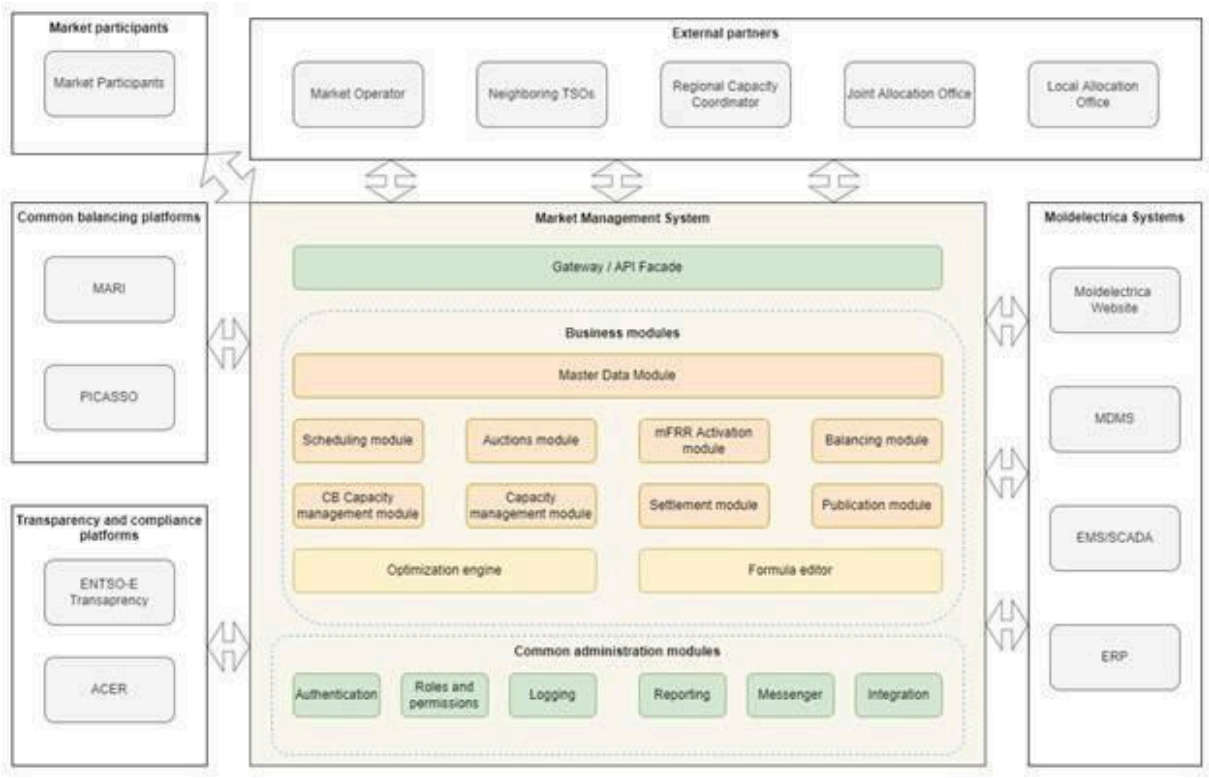


Figure 10: Functional architecture of the MMS

The Market Management System is a microservice-based solution, where each module performs specific functions independently. The system uses internal REST APIs or message queue solutions to communicate internally between modules. The external communication with market participants, external partners, common balancing platforms and transparency and compliance platforms is centralized and performed via Gateway/API Façade.

The different modules of the Market Management System are described in the following sections.

4.2.3 | Web access modules

4.2.3.1 | Gateway

The Gateway module serves as the centralized entry point for all external communication of the market management system. It enables both human-to-machine (via web browser) and machine-to-machine (via APIs) communication. It acts as an application gateway, isolating the core business modules from external access and public network.

The key functions of the Gateway are:

- **Access control:** Performs mandatory user authentication via SSO, LDAP/AD and 2FA.
- **API facade:** Provides secure web service API access for automated data exchange with market participants.
- **UI orchestration:** Manages the navigation between different application screens, ensuring that the displayed data is tailored to specific user roles and permissions.
- **Secure communication:** Ensures all traffic is encrypted via HTTPS and provides the necessary infrastructure for dedicated communication lines for External Users.
- **Integration hub:** Ensures data exchange with external parties (such as neighboring TSOs, JAO, etc.) and the internal modules (like Scheduling, Balancing, etc.)

The Gateway module covers the requirements from chapter 2.3.1 (User authentication) of the technical specification document.

4.2.4 | Business modules

4.2.4.1 | Master data

The master data module serves as the central repository of standing data for the entire Market Management System (MMS). Master data constitutes information that does not regularly change during daily operations of the TSO. The master data module ensures that all the other system modules have access to the same information and therefore can work in complete synchronization.

Key functions:

- **Market model configuration:** Ability to register and modify:
  - Grids

  - Scheduling areas
  - Market Participants and balance groups
  - Resources and their technical characteristics
  - Accounting points
  - Market roles and relations between entities
- **Market model management:**
  - Ability to suggest edits by market participants
  - Ability to import/export data to spreadsheets.
- **Market model propagation:** Synchronization of master data between modules of the system

Some of the master data specific to certain business modules will be stored and managed in the corresponding modules.

The Master Data module covers the requirements from chapter 6 (Market Participant Registration and standing data) of the technical specification document.

4.2.4.2 | Scheduling

The Scheduling module is responsible for supporting the planning processes of Moldelectrica by facilitating the exchange of schedule data between the MMS and market participants, neighboring TSOs, power exchanges and capacity allocation offices. The module ensures full compliance with the ENTSO-E Scheduling System (ESS) and CIM standards, as well as the Harmonized Electricity Market Model.

Key functions:

- **Schedule management**
  - Multi-channel collection and automatic validation of internal trade, external trade and physical schedules (TPS and PRS).
  - Support for renomination and schedule editing
  - Support for versioning
- **Full internal nomination lifecycle**
  - Support for long-term, short-term and intraday phases
  - Gating mechanism
  - Automated checks against collateral
  - Support for correction cycles
  - Automated matching process including rule-based final matching
  - Automated feedback processes (ACK/ANO/CNF)
  - Integration with power exchanges
- **Full cross-border nomination lifecycle**
  - Integration with allocation offices (CRD, CAX)

- Integration with neighboring TSOs (CAS)
- Support for long-term, short-term and intraday phases
- Gating mechanism
- Support for correction cycles
- Automated matching process including rule-based final matching
- Automated feedback process (ACK/ANO/CNF)
- Capacity curtailment
- Emergency help handling

- **Extensive parameterization**
  - Support for various granularity of time series (hourly, 15 min, minute, second, 4 seconds, etc.)
  - Fully parameterizable nomination process
  - Support for manual process control
- **Support for specialized regional functions**

The Scheduling module covers the requirements from chapter 3 (Scheduling Process) of the technical specification document.

4.2.4.3 | Auctions

The auction module is responsible for handling the different tenders based on closed-gate auctions (balancing capacity and energy, grid losses), following the processes defined by Moldelectrica. It provides functionalities allowing operators to configure and monitor the tenders' execution, as well as market participants to submit offers. It also integrates with the optimization engine to compute the results of the tenders. The module ensures compliance with the ENTSO-E product and bid model.

Key functions:

- **Common Features (All Auctions)**
  - Tender orchestration and gating mechanism management
  - Configurable market rules, like the clearing price mechanisms (pay-as-bid or marginal price)
  - Multi-channel offer submission (Web UI, XML upload, web services)
  - Offer versioning and history tracking
  - Syntactical and semantical validations
  - Automated acknowledgements and tender announcements
  - Integration with the optimisation engine for market clearing.
  - Integration with the settlement module.
- **Balancing Market (BM) Capacity**
  - Manual or file-upload input of reserve requirements
  - Support for standard ENTSO-E and local capacity products

    - Offer validation against BSP pre-qualification and maximum capacity limits
    - Integration of direct bilateral agreements as winning offers
    - Tender cancellation and repeated auction management
    - Integration with the scheduling module
    - Integration with the reserve capacity management module
- **Balancing Market (BM) Energy**
    - Calculation of balancing energy needs based on schedules and system load
    - Support for standard ENTSO-E and local energy products
    - Automatic generation of default bids for non-submitting BSPs
    - Offer validation against availability declarations, generation schedules, and dynamic price limits
    - Support for network constraints
    - Generation and tracking of activation orders
    - Emergency activation of non-prequalified units with default offers
    - SCADA-EMS integration for automatic aFRR activation.
- **Procurement of Grid Losses**
    - Support for grid losses products (time frames, delivery profiles, volume types, etc.)
    - Multi-stage clearing process (preliminary results, open negotiation, final results)
    - Open negotiation phase, allowing for offer price reduction
    - Dynamic deadline extensions and automated tender cancellations based on participant thresholds
    - Manual exclusion of winners and instant evaluation rerun

The auction module covers the requirements from chapter 4 (Balancing Market) and 5 (Grid Losses) of the technical specification document.

4.2.4.4 | Cross-border capacity management

The cross-border capacity management module provides a comprehensive suite of tools to calculate available transmission capacity. It supports the current NTC-based methodologies, while being fully future-proofed for flow-based. It also supports the Coordinated Capacity Calculation (CCC) frameworks.

Key functions:

- Current NTC-based methodology
- Processing of input parameters (TTC/TRM/AAC)
- Calculation NTC and ATC via configurable formulas
- Integration with neighboring TSOs (e.g., minimum value rule)

- Integration with external regional capacity coordinators for CCC

The cross-border capacity management module covers the requirements from chapter 3.16 (Establish offered capacity) of the technical specification document.

4.2.4.5 | Reserve capacity management

The internal capacity management module is responsible for handling the processes of capacity surrender and transfer between market participants. It also serves as the single source of truth for any capacity inquiries by users and other business modules of MMS.

Key functions:

- **Capacity synchronization**
  - Full integration with Auctions module
- **Capacity management**
  - Capacity dashboard
  - Support for capacity surrender
  - Support for capacity transfer
  - Extensive validations to ensure valid results

The Internal Capacity Management module covers the requirements from chapter 4.3.7 (Capacity transfer) of the technical specification document.

4.2.4.6 | mFRR activation

The mFRR activation module is designed to handle the real-time activation of mFRR reserves to maintain stable power system frequency in a secure and automated way. Additionally, it facilitates the integration with the European MARI platform.

Key functions:

- **Local mFRR dispatching**
  - Automated and manual handling of activation instructions
  - Direct and scheduled activation
  - Automated bid selection
  - Support for out of merit activation
  - Support for congestion management processes
  - Registration of non-availability of resources
  - Secure API-based integration with balance service providers (ARQ, ARS, ACK)
- **Integration with MARI**

- Support for local and common merit order lists
- Support for non-availability information
- Support for the connection to the ECP platform
- Management of the activation process
- Secure API-based integration with balance service providers (ARQ, ARS, ACK)

The mFRR Activation module covers the requirements from chapter 4.4.7 (Activation of balancing energy) of the technical specification document.

4.2.4.7 | Balancing

The balancing module is responsible for calculating the physical imbalance volume of each imbalance energy account administered in the MMS system. The calculation uses inputs from multiple other modules, and aggregates the information according to the balance delegation between imbalance energy accounts. Additionally, the module provides detailed information to both the settlement administrator and market participants about all the input data (components of metered data, trade schedule data, reserve activation data, etc.), as well as output of the imbalance calculation process (aggregated account data). Finally, the balancing module handles the creation of data layers that provide linking of input data to calculation results, as well as settlement results.

Key functions

- **Balancing process management**
  - Clearing calendar
  - Support for multiple calculation and reconciliations
  - Support for data tagging
- **Data collection**
  - Import of required input data from multiple business modules of MMS
  - Import of metered data from the MDMS
- **Imbalance calculation**
  - Transformation of input data into balancing components
  - Calculation of imbalance
  - Handling imbalance delegation
  - Comprehensive reporting on the balancing components and imbalance results on user interfaces

The Balancing, Settlement and Formula Editor modules cover the requirements from chapter 7 (Settlement) of the technical specification document.

4.2.4.8 | Settlement

The Settlement module is a complete and integrated solution within the MMS, designed to handle all financial transactions related to Moldelectrica's electricity market activities. It is a flexible, configurable, and high-performance engine that calculates charges, revenues, and periodic billing for market participants. Settlement module is based on a flexible formula editor allowing settlement administrator to edit calculation logic independently. Additionally, the module enables invoicing functions, as well as integration with ERP systems.

Key functions:

- **Management of settlement-specific master data**
  - Registration and editing of company information
  - Registration and editing of settlement contract information
- **Core settlement**
  - Powerful calculation engine to manage a large volume of data
  - Imbalance settlement
  - Balancing energy settlement
  - Ancillary services settlement
  - Settlement of non-compliance with AS/BS
  - Grid losses settlement
  - Support for tariff settlement (optional, separately priced)
  - Support for special local market settlements
- **TSO-TSO settlement**
  - Support for FSKAR process, imbalance netting process.
  - MARI/PICASSO process support
  - Emergency help settlement
- **Custom settlement**
  - Support for local settlement calculations
- **Price formation**
  - Calculation of market prices for imbalance and balancing energy
- **Integration with Power Exchanges**
  - Collection of market prices
- **Settlement workflow**
  - Support for manual and automated settlement runs
  - Integration with the data layers in Balancing module
  - Support for scheduled calculations
  - Support for multiple recalculations
  - Detailed overview of settlement results and final confirmation process
  - Generation of settlement reports/invoices

  - Support for digital signature
  - Support for reconciliation functions
  - Management of report/invoice lifecycle and payment status
  - Management of market participant's and TSO's debt
- **Support for collateral management and the calculation of financial guarantee**
- **Integration with ERP system**

The Balancing, Settlement and Formula Editor modules cover the requirements from chapter 7 (Settlement) of the technical specification document.

The **settlement of electricity transmission services provided by the TSO to market participants** (optional feature requested in the tender documentation) is not included by default in the present commercial offer or in the proposed project timeline. For further details regarding the associated costs and implications of this option, please refer to the section "*Prerequisites and Assumptions*" under "*Item 5 – Contract Execution Schedule*" of the proposal submitted by the Consortium.

4.2.4.9 | Publication

The publication service is responsible for generating mandatory compliance and transparency reports and sending them to the corresponding organizations (ACER and ENTSO-E Transparency Platform). The module collects all the necessary input data from internal services, performs aggregations and forms electronic documents in the required formats for the reporting.

Key functions:

- **Report preparation**
  - Multi-source (application, SFTP file storage, etc.) input data collection
  - Data aggregation
  - XML generation according to the reporting standards of ACER (REMIT) and ENTSO-E
- **Reporting process**
  - Regulatory reporting to ACER (REMIT) and ENTSO-E via API
  - Flexible scheduling of publications
  - Automated and event-driven publications
  - Preview of publications
  - Detailed log of the publication process
  - Parameterized publications (based on user selection)
  - Support for all standard reports

- Support for data forwarding to external file storage locations (SFTP)

The Publication, Data warehouse (DWH) and Reporting modules cover the requirements from chapter 8 (Reporting) of the technical specification document.

4.2.4.10 | Optimization engine

The optimization engine is responsible for the clearing process of the different tenders by matching bids and offers and fixing prices. It is based on the N-SIDE Power Matching algorithm, a powerful engine used for various markets around the world (balancing market in the Baltics, UK auxiliary services market, Indian day-ahead market, Japan day-ahead market, etc.), making the MMS ready for the coming growth of Moldova needs.

Key functions:

- Procurement cost minimization
- Configurable pricing rules ("pay-as-bid" or "marginal price").
- Forcing bid acceptance
- Multiple time periods
- Divisible and indivisible bids.
- Multiple product types and directions (upward/downward).
- Configurable rounding rules
- Multi-step optimization to include bids of non-prequalified units
- Network constraints (ATC and flow based)

4.2.4.11 | Formula editor

The Formula Editor is a core component of the Settlement module, providing administrator users a graphical and highly configurable environment to manage the mathematical logic of settlement calculations. It provides transparency of the calculation logic, and allows users to edit the formulas to comply with the evolving and changing regulatory environment in Moldova.

Key functions:

- **Graphical interface**
  - User-friendly display of formulas
  - Support for complex formulas (formula within the formula)
  - Support for multiple formula revisions and validity intervals
- **Flexible formula management**
  - Support for formula modification by users

  - Support for basic operations (addition, subtraction, multiplication, division)
  - Support for complex operations (If/Then/Else, Min/Max/Avg, etc.)
- **Formula control**
  - Detailed formula change log
  - Clear connection between settlement calculations and used formulas

The Balancing, Settlement and Formula Editor modules cover the requirements from chapter 7 (Settlement) of the technical specification document.

4.2.5 | Common administrative modules

4.2.5.1 | User management

This service is responsible for registration and management of system users. Users can be configured with different authentication methods, including:

- Username/password
- SSO certificate
- Active directory

Additionally, the system may be configured with the requirement to perform 2-factor authentication.

Users are connected to specific companies and roles that determine what data they have access to in the system.

The User Management and Roles and permissions management modules cover the requirements from chapter 2.3.2 (User permissions & roles) of the technical specification document.

4.2.5.2 | Roles and permission management

The service allows administrator users to create and manage user roles. Roles can be associated with users, and contain a set of permissions. The system provides a detailed list of permissions associated with different user interfaces, and specific functions on those interfaces, allowing for precise control over the content users have access to.

The User Management and Roles and permissions management modules cover the requirements from chapter 2.3.2 (User permissions & roles) of the technical specification document.

4.2.5.3 | Logging

All activities in the system are logged and made available for audit purposes.

Key functions:

- Event log to keep track of user and system actions
- Webservice log to keep track of external communication
- File transfer log to keep track of file exchanged between modules and with users via UI/API Façade
- Email log to keep track of email messages exchanged between MMS and external systems/users
- Job history to keep track of scheduled processes (e.g. Settlement calculations, nomination processes, publications, etc.)
- Module-specific audit to keep track of specific business processes (e.g., capacity transfer, nomination timeline, etc.)
- Application log to keep detailed information about system activity and errors

The Logging services cover the requirements from chapter 2.4.7 (Auditing Capabilities) of the technical specification document.

4.2.5.4 | DWH and reporting

A Data Warehouse (DWH) is a centralized analytical data repository designed to collect, consolidate, structure, and preserve data from operational modules of MMS. (e.g., scheduling, balancing, settlement, capacity management). DWH serves as a data platform for internal reporting, analytics and decision support.

Key functions of the DWH:

- Automatic data extraction from core business modules
- Data transformation and structurization
- Separation of load from the operational system
- Foundation for internal reporting and advanced analytics

Following the handover of the Data Warehouse by Navitasoft, Sandrologic assumes full operational responsibility for DWH maintenance and data availability. Sandrologic designs, develops, and maintains the local reporting module, ensuring timely fulfillment of all mandatory regulatory reporting obligations toward Moldovan authorities (ANRE and others) throughout the contract term.

Key functions of the Reporting module:

- Automated generation of mandatory regulatory reports (ANRE and others)

- Configurable report templates in Romanian and Russian
- Scheduled and on-demand report execution
- Export to standard formats (PDF, XLSX, CSV)
- Role-based access to reporting functions
- Audit trail for all generated reports

The Publication, Data warehouse (DWH) and Reporting modules cover the requirements from chapter 8 (Reporting) of the technical specification document.

4.2.5.5 | Messenger

The Messenger module is a centralized notification and communication component responsible for generating and delivering automated messages based on system events, business triggers, or scheduled jobs. It ensures timely, traceable, and configurable communication with internal users, market participants, and external stakeholders.

Key features:

- Support for manual, scheduled and event-driven notifications
- Ability to pause and resume the notification process
- Ability to send custom messages
- Ability to define recipients based on groups or permissions
- Support for template-based notifications
- Support for notifications in multiple languages
- User-friendly dashboards for notification management
- Support for advanced configuration

The Messenger module covers specific requirements from chapter 2.7.3 (UI architecture) of the technical specification document.

4.2.5.6 | Integration

The Integration modules connect the MMS with Moldelectrica's external systems — MDMS, ERP, and EMS/SCADA — through a middleware layer responsible for data mappings, adapter configuration, protocol translation, and end-to-end validation.

Sandrologic ensures data delivery from these external systems to the MMS in the required format via two channels:

- REST API endpoints — for synchronous request-response data exchange
- Kafka endpoints — for asynchronous event-driven data streaming

The module supports both real-time and batch data exchange across all interfaces and covers System Integration Testing for all connected systems.

4.3 | Fit for non-functional requirements

To guarantee that Moldelectrica can operate the market securely, continuously, and efficiently, our solution is engineered to meet and exceed all technical, security, and operational standards outlined in the RFP. Leveraging the complementary strengths of our Consortium, we provide a highly resilient, enterprise-grade platform.

The sections below describe how our solution aligns with your core non-functional requirements.

4.3.1 | System-level requirements

Built on a microservice-based architecture, the MMS system is inherently scalable and designed to effortlessly support market expansion, handling high volumes of market participants and data over the next 10 years.

To ensure safe configuration and testing of new market rules, we will provision three fully isolated environments: Production, Development/Testing, and Disaster Recovery.

Furthermore, the user interface natively supports English language, and support for Romanian and Russian will be added with the assistance of Moldelectrica for translations, ensuring seamless adoption by local operators and market participants.

4.3.2 | Minimum architecture requirements

Geographical Redundancy: The solution spans two physically separate Moldelectrica data centers — Main Site (Production) and Back-up Site (Disaster Recovery) — operating in Active/Passive mode with continuous synchronization. A third minimal environment (Dev/Test) is deployed on-premise at the Main Site.

Automated Failover: SQL Server Always On Availability Groups provide automatic database failover within 5 minutes. WAF-based traffic routing enables controlled site switchover. Manual fallback to the DR site is completed within 15 minutes without data loss.

4.3.3 | Security requirements

All external and internal communications pass through a secure Gateway module within the MMS system, which enforces single sign-on (SSO), LDAP/AD integration, two-factor authentication (2FA), and secure token-based API access. Additionally, a dedicated Roles and Permissions module uses role-based access control to precisely restrict data, screens, and actions based on the user's specific operational privileges.

4.3.4 | Data management requirements

The Master Data, Formula Editor and Auction modules of the MMS system utilize effective date tagging, ensuring that the correct, time-stamped reference data and rules are always applied to the corresponding settlement periods, while referential integrity is enforced to prevent database corruption.

The platform supports automated daily and monthly backups, retaining live operational data for a configurable 36 months, and archiving all records for a minimum of 10 years to ensure strict regulatory compliance.

Moreover, every user action, data input, and configuration change is reliably recorded by a centralized Logging module to provide a complete, transparent audit trail.

4.3.5 | System Availability & reliability requirements

The MMS system is designed for 24/7 continuous operation with 99.5% guaranteed availability and no single point of failure. The redundant architecture guarantees that automated failovers limit database downtime to a maximum of 5 minutes, while any necessary manual site fallbacks will be completed within 15 minutes without data loss.

4.3.6 | Hardware and deployment requirements

Optimized Infrastructure: Enterprise-grade hardware across three isolated environments (Production, DR, Dev/Test), sized and validated against Consortium technical specifications for the full operational lifetime of the platform.

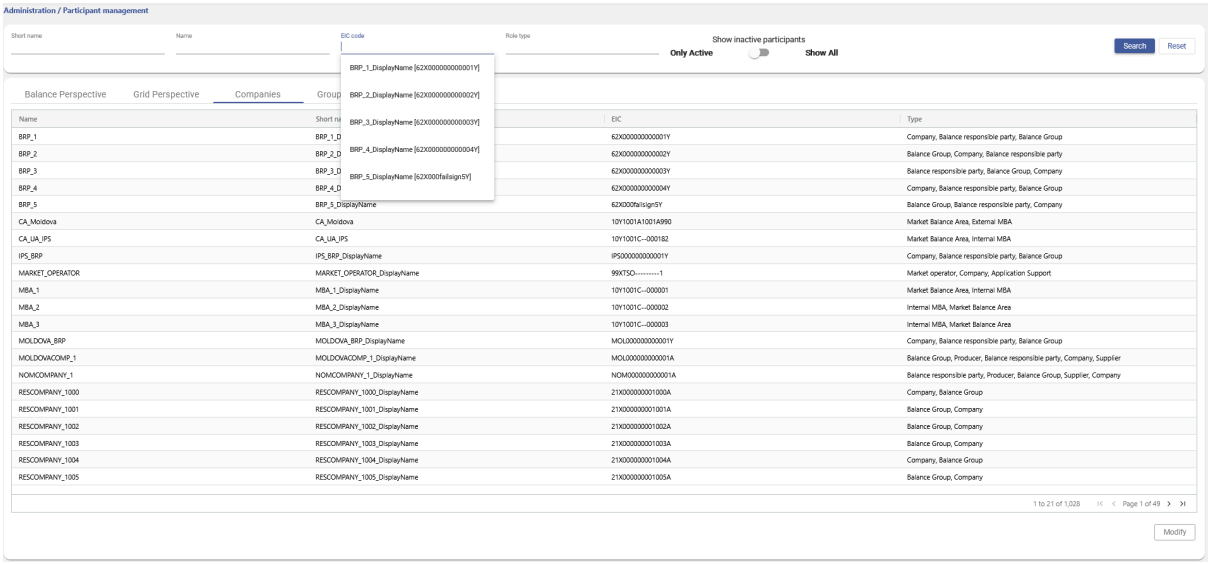
Dedicated Virtualization: Proxmox VE hypervisor hosts Linux VMs for MMS application services under Kubernetes orchestration, and Windows Server VMs for the MS SQL Server database tier in Always On cluster configuration — consistent with Moldelectrica's existing hypervisor stack.

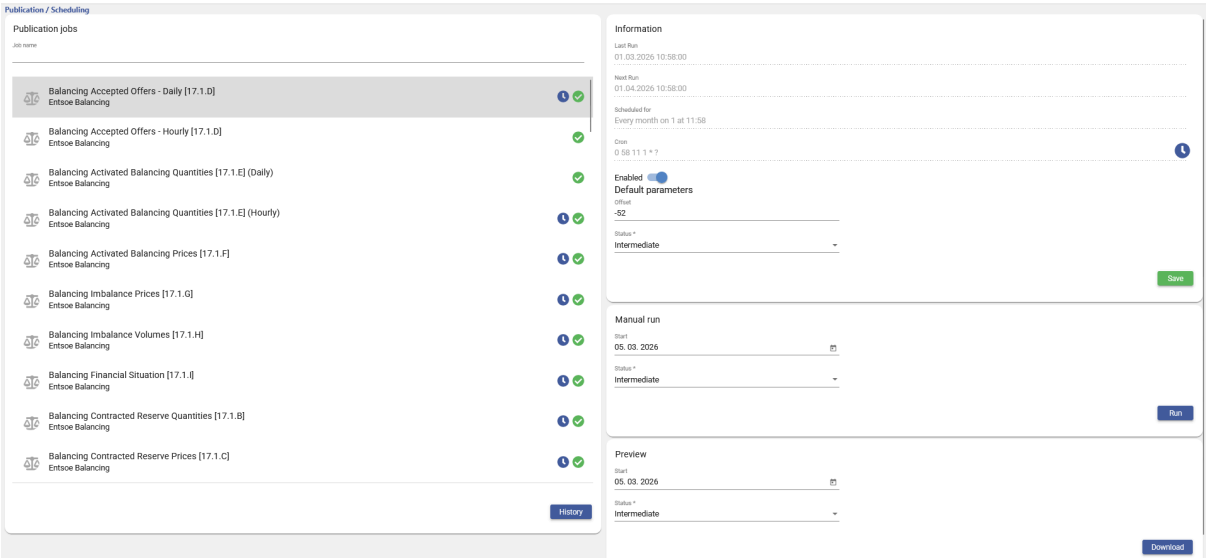
Operator Workstations: 12 enterprise-grade workstations installed on-site: 2 units with ≥4 monitors 27" for chief dispatchers, 10 units with ≥2 monitors 27" for standard operators. All include KVM switches, keyboards, and mice.

4.3.7 | User Interfaces

The MMS system features a modern, web-based user interface built on Angular technology, delivering an intuitive, responsive, and user-friendly experience across all functional modules. The interface is designed to ensure ease of use, consistency, and efficiency in daily operations, supporting both operational and administrative users. Its flexible architecture enables fast adaptation to evolving business requirements, while ensuring high performance, reliability, and security. The solution supports seamless integration with backend services and provides a consistent user experience across devices and screen resolutions, aligning with current industry standards and user expectations.

See below a few examples of the user interfaces implemented in the MMS.




Publication / Scheduling
Publication jobs
Balancing Accepted Offers - Daily [17.1.D]
Entsoe Balancing
Balancing Accepted Offers - Hourly [17.1.D]
Entsoe Balancing
Balancing Activated Balancing Quantities [17.1.E] (Daily)
Entsoe Balancing
Balancing Activated Balancing Quantities [17.1.E] (Hourly)
Entsoe Balancing
Balancing Activated Balancing Prices [17.1.F]
Entsoe Balancing
Balancing Imbalance Prices [17.1.G]
Entsoe Balancing
Balancing Imbalance Volumes [17.1.H]
Entsoe Balancing
Balancing Financial Situation [17.1.I]
Entsoe Balancing
Balancing Contracted Reserve Quantities [17.1.B]
Entsoe Balancing
Balancing Contracted Reserve Prices [17.1.C]
Entsoe Balancing
History
Information
Last Run
01.03.2026 10:58:00
Next Run
01.04.2026 10:58:00
Scheduled for
Every month on 1 at 11:58
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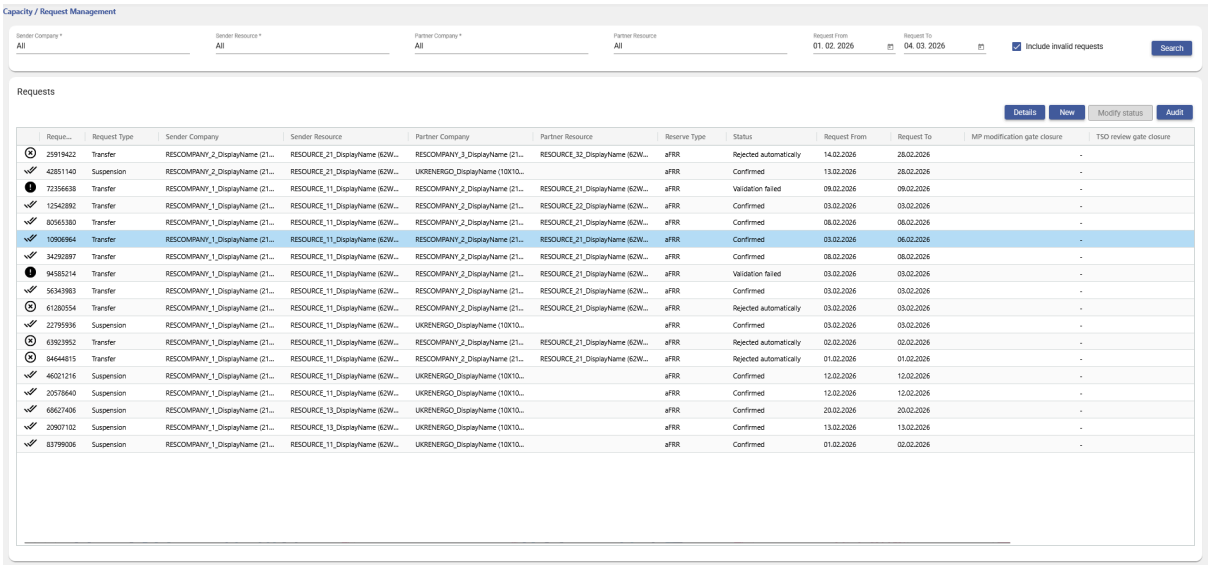
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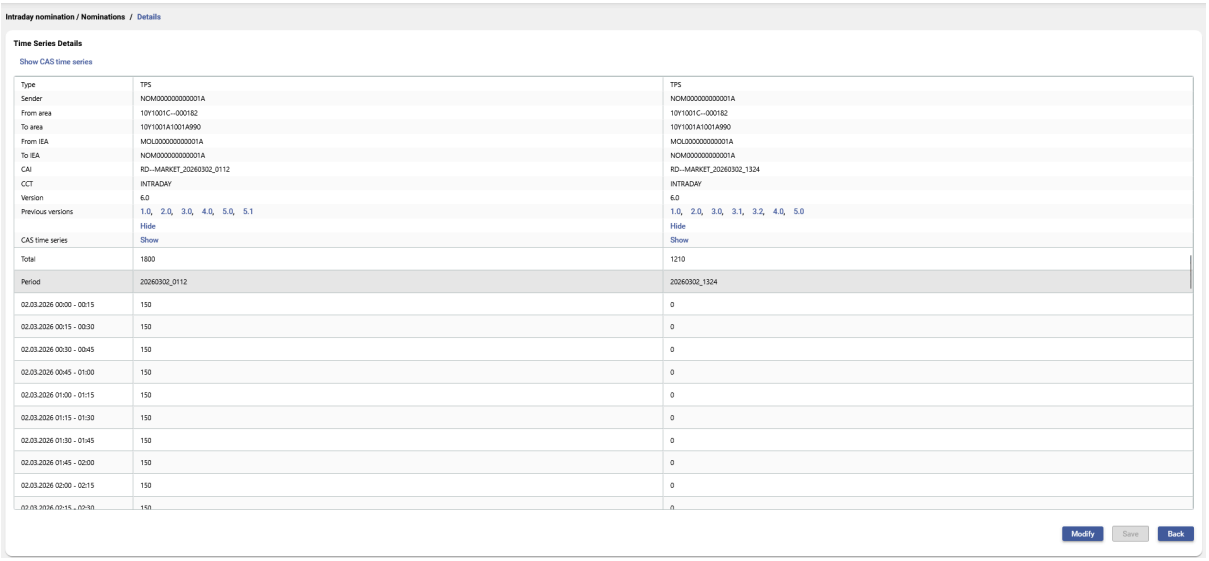
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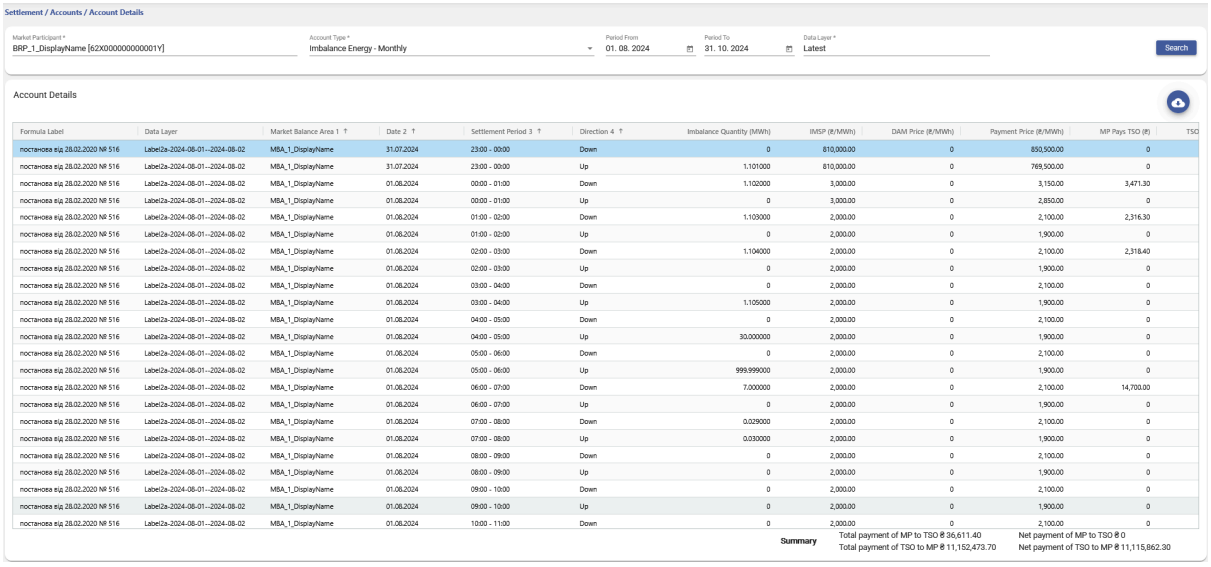

Figure 11: Examples of user interfaces

4.3.8 | Validation requirements

All modules across the MMS system validate inputs, both syntactical and semantical, using a standardized validation framework. The MMS system is highly configurable to accommodate evolving business needs and market designs. For instance, the Auction module allows operators to adapt the market rules of each specific market through its graphical interface. Additionally, administrators can independently modify validation logic and formulas through the graphical Formula Editor. All configuration changes are automatically tracked in the audit log.

4.3.9 | Training requirements

Led by Navitasoft, we will execute a comprehensive training strategy featuring customized, onsite sessions for Moldelectrica's IT administrators, testing teams, system operators, and 1st-line support staff. This intensive knowledge transfer ensures your teams are fully self-sufficient and confident in operating, maintaining, and supporting the MMS system from day one.

5 | Implementation approach

This section outlines the methodology that will be followed to deliver the project, focusing on the "how" — namely, the types of activities that will be carried out throughout its implementation. For details on the "when," including the sequencing and timing of activities, please refer to Annex 5, which presents the project execution plan and its phases.

5.1 | Initiation & planning

Once the contract is signed and Moldelectrica's SPOC is identified, an on-site (or virtual) kickoff meeting will align stakeholders on goals, expectations, and initial plans. Project charter and Project provisions (stakeholder map, risk register, communication plan, lessons log, all PMI best practice docs, ...) will also be created during this stage (and will be continuously updated in subsequent stages), as well as documentation and training plans (with expected content, format, deadlines, owner and approver) and testing strategy (with expected test types, stakeholder responsibilities, environments, methodologies, and required inputs).

5.2 | Design

Over the first months of the project, frequent workshops between the Consortium (N-SIDE, Navitasoft), the local partner (Sandrologic) and Moldelectrica will define high-level software design aspects, including functionalities, architecture, user types, data templates and APIs. The design and its corresponding acceptance criteria will be documented in a written report, which will serve as a basis for defining the project's scope and identifying any future change requests. The project execution plan (i.e. timeline) will be refined once the high-level design is approved.

Particular attention will be given throughout the project to organizing technical sessions, workshops, and ad-hoc meetings between subject-matter experts, with a strong focus on technical content. While the main outcomes of these discussions will be reported to the project board as needed, the board itself will not be directly involved in the technical deliberations.

5.3 | Development & Configuration

Agile methodology (Scrum) will be used for the software development phases. The Consortium will consult Moldelectrica experts to build and refine the product backlog. This strategy will facilitate iterative building, early testing, configuration adaptation and optimisation, step-by-step delivery, and user feedback collection.

By employing AGILE development principles, we can use several risk mitigation strategies that this development approach enables.

- Frequent iterations
- Incremental delivery
- Test driven development

- Continuous delivery
- Adaptive planning based on priority and transparency

We apply a structured Scrum methodology based on two-week sprints to ensure incremental, high-quality delivery. Requirements are maintained and prioritized in the Product Backlog, from which selected items are committed into the Sprint Backlog during Sprint Planning. Each sprint includes continuous functional development, test development, test planning, testing, and deployment activities, supported by daily stand-up meetings to ensure transparency and alignment.

At the end of each sprint, a potentially shippable software increment is delivered and demonstrated during the Sprint Demo. The process is reinforced by regular Sprint Retrospectives to drive continuous improvement and formal release handover where applicable. This iterative approach ensures predictable delivery, early validation, controlled risk, and ongoing stakeholder involvement throughout the project lifecycle.

Planning meetings: Two weeks beforehand of the meeting, Modelectrica must provide inputs for the development. If the inputs are not provided, the teams will work on other stories that are ready and have all the required information from Moldelectrica. Failure to provide inputs on time may lead to a re-prioritization of the backlog and sprints, and in the worst case, could result in project delays.

Demo (Training) sessions: Every four weeks, during the demo session, the Consortium will present the developed functionalities and install the release in the test environment. The demo will also serve as a training session, during which Modelectrica is responsible for assigning key users and a Product Owner to carry out the User Acceptance Testing (UAT). Once the demo and training are completed, the Consortium will provide the test scenarios, based on which Modelectrica will begin testing the release.

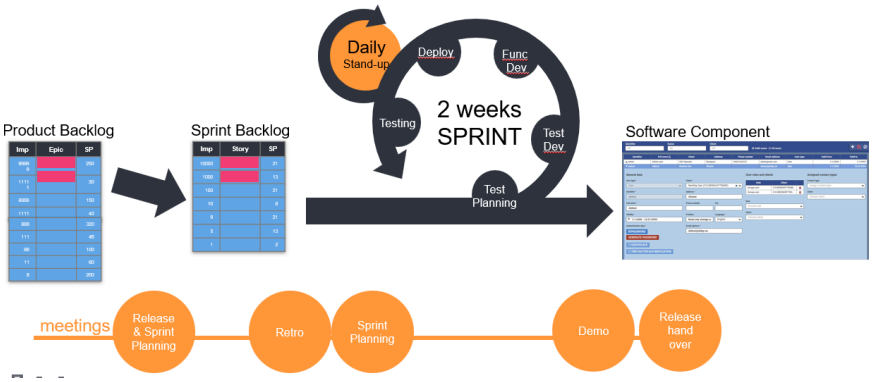

Figure 12: Development methodology with 2 weeks sprints

5.4 | Hardware provision, Setup of the environments on the hardware & Integration

Navtiasoft, N-SIDE and Sandrologic Group will jointly procure the hardware and infrastructure-level software. Sandrologic will coordinate delivery logistics, perform on-site acceptance inspection, and manage installation and commissioning across both data center locations. Installation covers both data center locations: rack mounting, Proxmox hypervisor configuration, provisioning of all three environments, Active Directory setup, network integration (1G/10G SFP, dual connections per switch), Fortinet firewall configuration, and two-tier storage commissioning with tape archival for 10-year retention.

Infrastructure will be formally certified ready for application installation before Navitasoft begins deployment. In parallel, Sandrologic will implement all MMS integrations with MDMS, ERP, and EMS/SCADA — developing middleware, data mappings, and API adapters per Consortium specifications — and lead System Integration Testing for all external interfaces.

5.5 | Testing & validation

The Consortium will follow industry best practices for functional and non-functional testing, with responsibilities shared among stakeholders, as depicted in the table below:

	N-SIDE	Navitasoft	Sandrologic	Moldelectrica
Functional testing				
Unit testing	yes	yes	yes	no
Functional/system testing	yes	yes	yes	no
System integration testing	yes	yes	yes	no
Graphical user interface testing	no	yes	yes	no
User acceptance testing	no	no	no	yes
Operational acceptance testing	no	no	no	yes
Non-functional testing				

Security testing	yes	yes	yes	no
Penetration testing	no	no	no	yes (via third party)
Infrastructure resilience testing	no	yes	no	no
Disaster recovery testing	no	yes	no	no
Performance testing for algorithm modules	Out of scope			
Load & stress tests combining all modules of the energy market management platform	Out of scope			

5.5.1 | Testing strategy and Q&A process

The test strategy will be clarified at the beginning of the project (Project Initiation Phase), including definition of test stages, test data, and environment requirements. For each test stage, specific test coverage and priorities will be defined within a Test Plan, which will encompass the detailed scope and will define the test objectives for this stage of testing.

The test scenarios will be defined by the Consortium, in cooperation with Moldelectrica, during the early stages of the development process. They will be implemented during the sprint, and executed by the testers of the Scrum team.
Test scenarios will be submitted to Moldelectrica no later than one month before the execution of the tests and refined based on the comments by Moldelectrica in an iterative process. The final scope of the test scenarios will have to be approved by Moldelectrica. In agile development methodology, the test scenarios can be refined and extended during the process as the need for new and previously unexpected test scenarios emerge.

These test scenarios will be further broken down into test cases, especially together with the definition of user stories. Test cases are designed to cover the testing of a certain feature or functionality in detail through a set of actions. Test cases are based on the stories and recorded, monitored and reported through the Jira system. These user stories are written with a high level of detail to cover the specific requirements of testing.

The Consortium will provide concise test reports for each agreed testing phase (including system integration tests, disaster recovery, generic security testing, and infrastructure resilience), summarizing the scope of tests performed, overall results (i.e., pass/fail status), and the status and severity of any identified defects.

The Consortium will provision the required test and disaster recovery environments to support system integration, validation, and acceptance activities, ensuring they are properly configured, representative of the production setup where necessary, and available in line with the agreed project plan.

5.5.2 | Types of tests

The test types and levels are defined according to the standards set by the International Software Testing Qualifications Board (ISTQB). As a general rule, software developers write the automated unit and integration tests, which run at every build of the software code. Other types of tests are executed based on the planning agreed at the beginning of the project and can either be manually executed or automated.

5.5.2.1 | Unit, functional/system and graphical user interface testing

Throughout the development, N-SIDE, Navitasoft, and Sandrologic will conduct continuous testing of their respective modules as part of the CI/CD pipeline. This will include static testing, using linting rules to ensure code quality; unit testing to verify individual software components in isolation; and functional/system testing to assess the tool's functionalities from an end-to-end perspective, ensuring compliance with project requirements. More precisely, the main goals of those functional tests are: coverage of requirements, coverage of the main processes and coverage of operational cases (use case). They aim to prove that the system has all the required functions and features specified. Acceptance and rejection criteria are based on the business logic.

In addition, Navitasoft will perform dedicated graphical user interface (GUI) testing to validate usability, consistency, responsiveness, and correct interaction flows across supported browsers and devices.

Those tests will be written by the developers and will be part of the build/deployment process. They therefore aim to prevent regressions, ensure a high-quality user experience, and validate the correct implementation of new features. Testing activities will commence at the start of development and will continue throughout the entire duration of the project.

5.5.2.2 | System integration testing

Once development progresses, Parties lead by Sandrologic will perform system integration testing (SIT) to verify the Energy Market Management Platform's proper integration with the external systems, and Navitasoft and the N-SIDE will verify proper integration between the internal modules. The testing will be carried out in a way that each system's developer or master user will be responsible for their end of the testing.

The goal of the integration tests is to find errors between connected modules (within the system), interfaces and their interactions (operating systems, hardware, third party systems). The functionality of services and dependencies are tested, including possible data access, data exchange between the systems and the correct execution of processes, though they will not evaluate the quality of the computational results. Integration testing focuses on individual software components or units of code to verify interaction between various software components and detect interface defects.

Integration Tests will be written by the developers, and is part of the acceptance criteria. Execution of the Integration Tests is part of the build/deployment process. The automated integration tests are designed in advance by the developers before writing the actual full code.
Integration tests will begin early in the project, starting with the delivery of the incremental releases shipped at the end of the first sprints. Integration tests cycles will be repeated whenever changes are made to the APIs and prior to each key release.

5.5.2.3 | User acceptance testing

The goal of the User Acceptance Test is to ensure by end-users that the system fulfills the requirements (Moldelectrica Functional Tests) and whether it works properly (Moldelectrica Integration Tests). UAT is the opportunity for the business to test a functionally proven and technically robust system, in a stable environment, against the business objectives. The recommended approach to be applied at User Acceptance Test is the following:

- User Acceptance Test is to be planned by Moldelectrica based on the test scenarios previously prepared and tested by the Consortium.
- User Acceptance Test cases and test data should be accepted by Moldelectrica end-users.
- User Acceptance Test scenarios should be written and executed on a module (business domain) basis first. The objective of this approach is to make sure that a single module works properly in itself.

- User Acceptance Test should include end-to-end and integration tests. This provides the guarantee that modules within the MMS, and MMS with integrated systems co-operate properly with each other.
- User Acceptance Tests must be executed in a continuous way after the delivery of each sprint release, and on the final release prior to production deployment / go-live (see section 5.5.3).

User acceptance testing will be carried out by Moldelectrica and supported by the Consortium. Test defects identified by Moldelectrica will have to be raised in a ticketing system for tracking purposes. The project team will hold regular meetings with Moldelectrica to review reported defects and severities, align on priorities, and define estimated resolution timelines.

5.5.2.4 | Security testing

N-SIDE, Navitasoft, and Sandrologic will perform comprehensive security assessments for each major release prior to delivery to Moldelectrica. These assessments will include, but not be limited to, dependency vulnerability analysis and container security scanning to ensure compliance with industry best practices and security standards.

Prior to go-live, Moldelectrica may decide to engage a qualified third-party security provider to oversee an independent penetration testing exercise. All findings identified during the penetration tests will be documented and assessed based on their severity and potential impact. Remediation actions will be implemented by the Consortium in alignment with agreed priorities and timelines mutually agreed with Moldelectrica.

Following go-live, penetration testing will be conducted on a yearly basis. Moldelectrica will remain responsible for coordinating and overseeing these annual third-party security assessments.

5.5.2.5 | Infrastructure resilience and disaster recovery testing

In addition, Navitasoft will conduct infrastructure resilience checks and disaster recovery (DR) validation exercises to ensure the robustness and continuity of the solution. Infrastructure resilience checks will assess the system's ability to withstand and recover from component failures, resource exhaustion, network disruptions, and other adverse conditions. This may include failover testing, backup verification, high-availability configuration reviews(if applicable), and controlled simulation of infrastructure incidents. Disaster recovery validation will confirm that recovery procedures, backup integrity, recovery time objectives (RTO), and recovery point objectives (RPO) are achievable and aligned with Moldelectrica's operational requirements. These tests will be performed prior to

go-live and subsequently on a periodic basis (at least annually or following major infrastructure changes), under the responsibility of Navitasoft and until backed by contractual obligatory, with results documented and shared with Moldelectrica.

5.5.2.6 | Performance testing

The Consortium will ensure that the system operates in accordance with the functional, availability, and reliability requirements defined in the tender All the previously listed tests will ensure the proper functioning of the platform. Should specific performance testing protocols be required, they may be addressed through the agreed governance and change management framework.

This approach is justified by the fact that the expected number of users and anticipated transaction volumes are significantly lower than the operational capacities typically supported by the software solutions of Navitasoft and N-SIDE in other production environments. The proposed platform is therefore dimensioned well within proven operational thresholds. In addition, the User Acceptance Testing (UAT) phase will validate the complete end-to-end workflow of the platform under realistic operating conditions and with a representative number of users, providing practical confirmation of system performance in line with Moldelectrica's needs.

5.5.2.7 | Operational acceptance testing

Prior to the go-live, Moldelectrica will be in charge of conducting Operational Acceptance Testing (OAT) to ensure that operational procedures such as system configuration and readiness are properly validated. Please refer to section 5.6 for more information on the criteria to be reached before the go-live.

5.5.3 | Responsibility of Moldelectrica in quality assurance

5.5.3.1 | Continuous testing during monthly sprint releases

Moldelectrica shall actively participate in the verification of the solution throughout the development lifecycle. With each monthly sprint release, Moldelectrica is responsible for:

- Reviewing delivered functionalities
- Ensuring internal familiarization with newly delivered features
- Executing validation activities in the designated test environment
- Preparing and maintaining business test scenarios based on the test documentation provided by the Consortium
- Providing structured written feedback within the agreed review period

The Consortium will provide baseline test cases and release documentation. Moldelectrica shall extend these into business-oriented and operational test scenarios reflecting real-life usage and regulatory requirements. Timely feedback from Moldelectrica is a prerequisite for maintaining the agreed delivery schedule.

5.5.3.2 | User Acceptance Testing prior to production deployment

Prior to production deployment (i.e. go-live) of both the Minimum Viable Product and the Full-Featured Product (see *"Idem 5 – Contract Execution Schedule"* for a description of those two elements), a dedicated one-month User Acceptance Testing (UAT) period shall be conducted. During this period:

- Moldelectrica bears primary responsibility for executing comprehensive business and operational testing.
- Moldelectrica shall ensure availability of qualified business users and subject matter experts.
- Moldelectrica shall execute end-to-end business process validation.
- Moldelectrica shall formally document and report defects, deviations, and observations.

The Consortium will provide support during the UAT period, including defect resolution in accordance with the agreed service levels; however, validation and acceptance responsibility remains with the responsibility of Moldelectrica.

5.6 | Go-live

The Consortium will collaborate with Moldelectrica to review and confirm key criteria for go-live readiness. These criteria will be defined at the start of the project, but based on our experience with critical go-lives, we recommend the following:

- A validated deployment, integration and configuration plan, tested in a Test environment before production.
- Completion of a one-month UAT period started after the release to Prod environment
- Resolution of all critical and major defects ahead of go-live, allowing sufficient time for Moldelectrica to retest and validate fixes. Minor defects may be accepted and addressed in early maintenance releases.
- Approval of test reports by Moldelectrica.
- Infrastructure readiness evidence, including security compliance.
- Delivery of training and documentation, ensuring end-users are ready to use the Energy Market Management Platform (as per section 6).

- Agreement on key operational procedures, such as release management, incident handling, and fallback measures (if ever applicable).
- Ensuring support readiness (as per section 7.1).
- Informing end-users about the go-live date and related practicalities.
- Formal written go-live readiness acceptance issued by Moldelectrica.

Note that those criteria might be different for the go-lives of the Minimum Viable Product and the Full-Featured Product (to be agreed at the beginning of the project).

To ensure a smooth transition, we recommend a two-week code freeze period before go-live, allowing Moldelectrica sufficient time for final approval of all aforementioned elements. During this period, no changes will be introduced, only major or critical bug fixing will be permitted.

The Consortium will support Moldelectrica for the creation of a comprehensive deployment, integration and configuration plan, detailing roles and responsibilities, sequencing of different actions, and coordination mechanisms. A complete go-live dry run will be conducted in a test environment to simulate real-world deployment conditions. Any lessons learned from this dry-run will be incorporated into the plan, and if necessary, the process will be repeated until the results are satisfactory.

On the go-live day, the deployment will be executed in alignment with the pre-established plan, with each responsible party performing their designated tasks. A dedicated war room will be set up to provide real-time coordination and issue resolution. If feasible, sanity checks will be conducted post-deployment to confirm successful installation and integration, validating the proper functioning of the Energy Market Management Platform. Continuous monitoring is carried out during the first execution of the Energy Market Management Platform allowing for real-time identification of any anomalies. The go-live war room shall ideally take place during business hours. Activities conducted outside these hours (such as during nights or weekends) will be subject to a Change Request process.

5.7 | Stabilization & hypercare

For one month following the go-live, an Early Life Support (ELS) phase is implemented. During this period where a potentially higher volume of incidents is expected, the 2nd-line and 3rd-line support teams will be reinforced with additional agents to ensure prompt responses to user queries and technical

issues. After the first month of operations we will move to the setup described in section 8.1.

All defects encountered post-go-live will be reported and managed through the service desk, as outlined in section 8.1. This centralized tracking system will ensure visibility into open issues, their resolution status, and response times. The defect management process will include prioritization based on impact, root cause analysis, and implementation of corrective actions to prevent recurrence.

6 | Project management framework

6.1 | Project management methodology

The project will be based on the PRINCE2 concepts and methodology for overall governance, utilizing key management products (such as the project initiation documentation, a risk register, change control, communication management, tracking of requirements,…) and processes (such as project initiation and stage control). This approach is chosen due to the highly regulated context of the project and the important number of stakeholders involved.

Navitasoft will lead project management activities for the Consortium. Navitasoft will assign a senior project manager with many years of experience in leading large-scale IT implementation projects and service delivery. The assigned project manager brings strong expertise in project management methodologies and software delivery frameworks, including SDLC, PRINCE2, Agile, and ITIL. This project manager will work in close collaboration with the N-SIDE project sponsor, a PRINCE2-certified professional with hands-on experience on the Enduring Auction Capability (EAC) platform for the procurement of ancillary services in the UK, who will provide oversight and methodological guidance throughout the project.

6.2 | Governance structure

A project board will be appointed, establishing a clear framework of authority, accountability, and decision-making to guide the project from initiation to closure. It will be constituted of 3 main roles, following default roles in PRINCE2:

- **An Executive,** i.e. the business-oriented person who's ultimately responsible for the overall success of the project. This role represents the interests of Moldelectrica and ensures the project aligns with their strategic goals and needs. This person will also be in charge of the final approval of the Change Requests. This person will be referred to as the "Moldelectrica

Project Sponsor" in the rest of the document. This person will be assisted by a "Moldelectrica Project Manager" who will be in charge of the day-to-day coordination of the project and will ensure alignment with all teams of Moldelectrica. This person will be the single point of contact for the project..

- **Senior Users,** i.e. representatives of the interests of those who will use the Energy Market Management Platform, i.e. Operators and Market Participants. Those Senior Users will ensure that the tool meets the functional and non-functional requirements and provides necessary business value. They are also responsible for defining test cases and quality gates.
- **Senior Suppliers,** i.e. the project sponsors and project managers representative of the interest of the suppliers (N-SIDE, Navitasoft and Sandrologic) who will ensure project's technical feasibility and delivery.

The project board will meet regularly (monthly meeting minimum) for directing and controlling the project. More precisely, the project board will (1) provide overall project direction, guidance, and advice, (2) ensure continuous business justification to meet the objectives of the project and final adoption of the Energy Market Management Platform, (3) review key milestones and authorize new project stages, (4) ensure all stakeholders are informed of project status, (5) make key decisions whenever required (ex: Change Requests).

6.3 | Risk management

The Consortium integrates a risk management and mitigation approach to all its implementation projects, fully aligned with PRINCE2 guidelines and formalized in our internal "Risk Management Policy." This policy is part of our broader governance framework and has been audited in the context of our ISO 27001 certification, ensuring consistency with recognized industry standards for security and operational resilience. Risk management is integrated into the project lifecycle from initiation through to closure and is built on five key pillars: identification, assessment, planning, response, and communication.

- **Risk Identification:** Risks are proactively identified at the proposal phase and on an ongoing basis once the project starts. This includes potential threats to scope, budget, schedule, quality, data integrity, and stakeholder alignment, as well as opportunities that could enhance project outcomes. The Consortium fosters a collaborative approach, actively involving all project team members, stakeholders, and technical experts in the identification process to capture a comprehensive view of potential risks.

- **Risks Assessment:** Each identified risk is assessed based on its likelihood of occurrence and the potential impact on the project objectives. Risks are then prioritized and categorized to facilitate targeted response strategies. This helps ensure that the most critical risks are addressed early and that resource allocation is aligned with actual risk exposure.
- **Risk Planning:** For each significant risk, a suitable response strategy is developed. This may involve avoidance (eliminating the risk), mitigation (reducing the likelihood or impact), transference, or acceptance (where the cost of mitigation outweighs the risk). Contingency plans are prepared as part of this process and may include measures such as allocating additional resources, adjusting the project timeline, conducting additional testing, implementing fallback procedures, modifying the design of the tool or adapting some requirements. Every risk is assigned a clearly defined Risk Owner, who is accountable for managing it, and a Risk Executor, who is responsible for carrying out the agreed response actions.
- **Risk Response:** If a risk materializes, the predefined response plan is executed without delay. In certain cases, proactive measures may be taken in advance to reduce the likelihood or impact of the risk. This approach helps ensure the project remains on track and minimizes potential disruptions. However, if unforeseen risks arise (those that could not have been reasonably anticipated or fully mitigated) and result in the need for changes to the agreed-upon design, the impact will be jointly assessed. Where significant, a formal Change Request will be initiated to address the necessary adjustments in scope, timeline, or cost.
- **Risk Communication:** Risks are regularly reviewed with the Project Board at a minimum of every two weeks, as part of standard project governance. During these meetings, the status of key risks, their evolution, and the effectiveness of mitigation actions are discussed. All risks, along with their status, history, and actions taken, are documented in a central Risk Register that is accessible to relevant stakeholders. This provides transparency, traceability, and accountability.

Project Managers will be responsible for ensuring that project risks are identified, assessed, and controlled throughout the project lifecycle. They are in charge of preparing and assisting in maintaining the project's risk register. They will encourage all delivery team members to participate in the identification, evaluation, and control of risks for the scope they are working on.

6.4 | Change management

6.4.1 | Definition of changes

Any deviation from the agreed initial project parameters will be considered as a Change, specifically in terms of scope, budget, quality, schedule, or deliverables. It is then treated as such and managed under the project's Change Control process.

This includes, but is not limited to:

- Requests for additional features or requirements not defined in the initial project scope, and modification of the features or requirements defined in the initial project scope(i.e. as defined in the document "*General_Description.pdf*" received during the tender phase)
- Adjustments to quality standards or acceptance criteria
- Deviations to the design reports written during the design phase
- Revisions that impact the project timeline or cost baseline
- Any item identified as "out of scope" in the section "*Out-of-scope*" under "*Item 5 – Contract Execution Schedule*" of the proposal submitted by the Consortium.

6.4.2 | Change control process

The Consortium will use its internal "Change Management Policy", aligned with the principles of ITIL4 Change Enablement and PRINCE2, to define an approach for identifying, classifying, documenting, designing, and approving changes.

The impact (in terms of cost, schedule, risk, and quality) will be evaluated, and a recommendation submitted to the designated Change Authority for approval before any work is undertaken. No changes will be implemented without prior written agreement from the appropriate authority, ensuring full traceability, budgetary control, and governance throughout the project lifecycle.

The terms of roles and responsibilities of the different stakeholders will be:

- **Change Requester:** The person who identifies the need for change and submits the initial request. Changes can be requested by Moldelectrica or by the Consortium when applicable.
- **Change Analyst(s):** The person(s) who analyze(s) and refine(s) the change request to understand the need and identify potential solutions, i.e. the technical leads of the Consortium (depending on the scope impacted by the change). These persons will also be responsible for conducting a risk assessment according to the Risk management policy and for identifying

which documentation and/or training materials must be updated to reflect the change. Meetings will be organized with the Change Requester to clarify the needs, or with other parties involved in development of the tool to clarify potential impacts in terms of solution integration, solution deployment or operational processes. Breaking changes will be avoided as much as possible.

- **Change Manager:** The person responsible for defining the implementation plan (how and when the change can be implemented), the associated cost, the validation plan (make sure that the change can be properly validated to avoid incidents), the rollback plan and the communication plan within the project organization. This person will prepare a comprehensive document ("Change Impact Assessment") conjointly with the Change Analyst to summarize all the information required by Moldelectrica to approve the change. Project Managers of the Consortium will endorse this role if the change concerns implementation or operational services under their responsibility.
- **Change Approver:** The person authorized to approve changes before execution, relying on the information submitted in the Change Impact Assessment. Note that the person approving the change must not be the same as the person requesting it. For this project, this role will be endorsed by the Project Sponsor of Moldelectrica.
- **Change Implementer:** The person responsible for carrying out the approved change according to the defined plans, including update of the documentation. Note that all changes made to the codebase and documentation will follow a version control process to ensure proper tracking of the changes. This person will also have to record deviations between the implementation plan and the actual execution of the change (and inform the project manager who will ask for the approval from the project board if ever the deviations are beyond the agreed specifications).
- **Change Tester:** Once implemented, the change will be available for testing by the different parties in a test environment. Note that the tester role should be separated from the implementer role. Moldelectrica testing team should always validate the changes conducted by the Consortium before their deployment in a production environment. The final approval will be done by the project board based on findings from the Change Tester(s).

6.4.3 | Mitigate impact of changes

To minimize the impact of the change requests on the project's timeline and budget, the Consortium will implement the following mitigation measures:

- Manage architectural changes by leveraging a **modular architecture designed to support backward compatibility.** This allows the system to evolve seamlessly over time while maintaining overall stability and minimizing the impact on dependent components.
- Foster **early and transparent communication** around any proposed changes, with particular attention to their potential cost and timeline implications.
- Ensure formal **sign-off on key deliverables** and design documents to establish a shared and validated understanding of the requirements across all stakeholders.
- Conduct **early-stage testing** and provide intermediate software releases to Moldelectrica, enabling prompt feedback and correction during development.
- Maintain a degree of f**lexibility to incorporate minor scope adjustments**, as long as the overall workload remains stable and within the agreed parameters.

6.5 | Communication & reporting

Effective communication and structured reporting are essential to ensure transparency, alignment, and timely decision-making throughout the project lifecycle. The Consortium will implement a clear communication framework designed to support operational coordination, executive oversight, and stakeholder engagement.

A multi-level communication model will be established:

- **Operational Level:** Regular working meetings between functional and technical teams to coordinate day-to-day activities, manage interfaces, and resolve issues promptly.
- **Project Management Level:** Weekly project meetings led by the Project Manager to review progress, risks, budget status, and upcoming milestones.
- **Steering Committee Level:** Monthly (or milestone-based) governance meetings by the Project Board to review overall progress, validate key deliverables, and address strategic decisions or escalations. Please refer also to section Governance structure.

An escalation mechanism will be formally defined to ensure that critical issues are addressed at the appropriate level without delay.

The Consortium will provide structured reporting to ensure full visibility on project performance. The reporting needs will be clarified during the project initiation phase and might include:

- **Periodic progress reports,** covering: status against plan, achieved milestones, key deliverables submitted, identified risks and mitigation actions, issues and change requests, resource overview
- **Risk and issue logs**, regularly updated and shared.
- **Milestone review reports,** summarizing outcomes of major phase completions.

All documentation will be stored in a shared collaboration environment to ensure traceability, version control, and transparency (share point to be provided by Moldelectrica).

6.6 | Resource management

6.6.1 | Resources from the Consortium

A detailed resource plan will be established during the project initiation phase and aligned with the agreed execution schedule. Resources will be allocated per phase (design, development, testing, deployment, stabilization) to ensure that the required competencies are available at the right time. Where required, subject matter experts (e.g., market design, settlement mechanisms, cross-border capacity, cybersecurity) will be mobilized to support specific activities.

Resource allocation will be reviewed regularly and adjusted when necessary to address evolving priorities or unforeseen constraints.

To ensure project continuity, key roles will be supported by designated backup profiles and knowledge sharing mechanisms will be implemented across teams.

6.6.2 | Resources from Moldelectrica

The successful implementation of the Market Management System requires active participation and timely involvement from Moldelectrica throughout the project lifecycle. The Consortium's planning and delivery approach assumes that the following resources will be made available by Moldelectrica, as appropriate and aligned with the project schedule.

- Moldelectrica will designate a **Project Manager** who will act as the primary point of contact and decision-making authority on organizational and operational matters. In addition, **business representatives and subject**

matter experts (e.g., balancing, settlement, market operations, regulatory aspects) will be required to participate in requirements clarification, design validation workshops, and acceptance activities.

- A dedicated **testing team** will be expected to support User Acceptance Testing (UAT), including preparation of test scenarios, execution of test cases, and validation of results from a business perspective. Timely feedback during testing phases is essential to maintain the agreed project timeline.
- Moldelectrica's **IT team** will oversee the maintenance of the infrastructure and environments post go-live. They will be onboarded during the integration project via different training sessions.
- Finally, **operational staff and 1st-line support personnel** will be involved during training, knowledge transfer, and go-live preparation to ensure readiness for production use.

The allocation and availability of these resources will be aligned during the project initiation phase and periodically reviewed to ensure continued alignment with the implementation plan.

Failure to allocate those resources or to provide timely inputs or approvals may result in schedule impacts for which the Consortium cannot be held responsible.

7 | Knowledge transfer framework

To ensure a seamless implementation and smooth transition, our approach to training, documentation, and education is designed to equip all relevant stakeholders with the necessary knowledge and resources.

7.1 | Training strategy

Training will be tailored for four primary user groups: IT administrators, testing teams, operators, and 1st-line support agents. Each group will receive role-specific training:

	IT Training	Testing Team Training	Operators Training	Support Training
Audience	IT team of Moldelectrica	Testing team of Moldelectrica	Operators of Moldelectrica	1st line of support of Moldelectrica
Objective	Facilitate the	Empower testing	Prepare	Ensure readiness

	installation of the EMMS and its integration with the external systems with limited supervision from the Consortium	teams with the knowledge required to confidently test the solution	production operation (i.e. explain how to use the system). Ensure adoption of the solution.	of the support teams
Content	Explanation of installation, configuration, and maintenance of the system + Walkthrough of the new APIs + Q&A	Present the latest updates in the system, highlight key changes, explanation on how to use the tool, … + Q&A	Walkthrough of the tool's functionalities and troubleshooting procedures Explaining on how to interpret the data + Demo + Q&A	Walkthrough of the first line support procedure (ex: troubleshooting, incident management) + High-level explanation of what changed in the last release + Mock tests + Q&A
Support	Installation Manual + API documentation	User Manual + Release notes	User Manual + Model & algorithm documentation (when necessary)	First line support procedures
Duration	1 ~ 1.5 hours per session	1.5 ~ 2 hours per session	2 ~ 3 hours per session	1.5 ~ 2 hours per session
Frequency	When each key release is ready for deployment	When each key release is deployed and ready for UAT	In parallel of the UAT of each key release to ensure readiness for go-live	In parallel of the UAT of each key release to ensure readiness for go-live
Location	Online	Online	On-site	Online

All those sessions will be prepared and held by Navitasoft, with ad-hoc interventions of Sandrologic or N-SIDE when necessary. The training sessions will be conducted in English. They will comprehend an instructor-led documentation walkthrough, and demonstration on an IT environment specific for the training purpose. Training materials will be delivered in English.

Please note that training sessions for Market Participants are not included within the base scope of the project. The underlying approach is to equip Moldelectrica

with the necessary knowledge and materials to independently train and support Market Participants. Should Moldelectrica require the Consortium to deliver direct training sessions to Market Participants, such activities may be considered and agreed through the formal Change Request procedure.

7.2 | Documentation strategy

The Consortium will provide structured documentation covering all critical aspects of the solution. The following key documents (in English) will be delivered as part of the project:

- **High-level design document (HLD):** The High-Level Design document will describe the overall architecture of the proposed solution, including conceptual, logical, physical, and deployment views. It will outline the main system components, their interactions, integration points with external systems, key data flows, architectural principles, and major technical decisions. The HLD will provide sufficient clarity to validate that the proposed solution meets the functional, technical, security, and availability requirements of the tender and is subject to Moldelectrica's review and approval prior to implementation.
- **Low-level design document (LLD):** The Low-Level Design document will provide detailed technical specifications required for implementation and configuration of the system. It will include detailed component descriptions, interface definitions (data formats and protocols), database structures, configuration settings, security mechanisms, validation rules, and process logic. The LLD will contain sufficient technical detail to support development, integration, testing, and deployment activities and will also be submitted for Moldelectrica's review and approval.
- **User Manuals (targeting end users)**: They will include step-by-step guides explaining how to use the tool's functionalities, clear instructions for performing common tasks and troubleshooting procedures to resolve common issues. Separate user manuals will be developed for each type of audience (ex: operator, market participants, …) to ensure the content is tailored to their specific roles, needs, and level of expertise.
- **Installation Manual (targeting IT Administrators):** A comprehensive guide including:
    - System architecture overview
    - Integration details
    - Hardware and software requirements
    - Deployment procedures for new releases

  - Available configuration parameters and configuration update procedure
- **First line support procedure (targeting Moldelectrica support team)**: A step-by-step guide on the troubleshooting procedures for the first line support.

Navitasoft will lead the preparation of these documents, with contributions from N-SIDE and Sandrologic as relevant to their respective areas of responsibility.
To ensure that all documentation remains up-to-date and accessible:

- **Change Control**: Documentation updates will adhere to a version control policy, ensuring that the latest versions are always available.
- **Storage & Access:** All documentation will be managed via a share point platform (to be provided by Moldelectrica) to ensure secure, centralized access. Email will not be used for documentation distribution.

8 | Operational excellence framework

8.1 | Support services

The following sections outline the support services proposed by the Consortium for this project, leveraging expertise gained from deploying several critical production tools for other customers.

8.1.1 | Organisation of the support

The support on the Energy Market Management Platform will be split between Moldelectrica and Sandrologic (acting as 1st-line support whose role is to make sure that the operations continues if there is an incident), and the Consortium (acting as 2nd-line and 3rd-line support whose roles are to provide workaround and make sure that incidents will not happen again).

Moldelectrica and Sandrologic are responsible for the operation of the tool and the **1st-line support,** which means:

- performing the triage of tickets, i.e. defining the type of request (support request, incident report, change request), the severity and the system impacted by the request.
- answering the questions on the usage of the Energy Market Management Platform that may be received from end-users.
- guaranteeing that the operations continue by means of pre-defined fallbacks and backup procedures (if applicable).

- forwarding the ticket to the 2nd-line support when required with all necessary information (logs, input / output files, relevant context, ...)
- monitoring and managing the production usage of the tool (ex: CPU and memory usage)
- validating the ticket once its resolution is finished.

Navitasoft will be in charge of the **2nd-line support**, i.e:

- providing technical and functional support to the 1st-line support, by helping them to apply the pre-defined fallbacks and backup procedures, or by helping them to answer the complex questions on the usage of the Energy Market Management Platform
- identifying the faulty module of the Energy Market Management Platform causing the issue, and forwarding the ticket to the relevant 3rd-line support.

Navitasoft will be actively involved during testing phases to acquire a broad understanding of the different modules of the Energy Market Management Platform to be able to act as 2nd-line support.

All members of the Consortium (N-SIDE, Navitasoft, Sandrologic) will provide a team of experts for the **3rd-line support** for their modules. Their role is to make sure Critical, Major and Minor incidents occurring in production do not happen again, by:

- diagnosing the cause and informing the 1st line support of the progress of the resolution
- proposing a workaround if applicable within the agreed SLAs
- delivering a hotfix release when the issue is critical or major
- documenting the incident and organizing a post-incident analysis.

The 3rd-line support team will involve subject matter experts, typically from the original development team, to handle complex technical and functional issues in their areas of expertise. To ensure continuity and responsiveness, redundancy will be built into all key roles to avoid reliance on single individuals.

8.1.2 | Delivery of hotfix releases

If a Critical Incident or Major Incident is raised, a hotfix release will be provided as soon as the issue is resolved. The Consortium will complete their own tests and validation of these hotfix releases, but Moldelectrica is also responsible for testing and validating these hotfix releases before their use in production. In case an incident is not of Critical and/or Major severity, the related correction is included in the next maintenance release of the tool (1 release per year). Minor severity

defects do not impact core functionality or system performance. They usually involve unusual but non-blocking events, cosmetic issues, minor inconsistencies, or edge cases that don't disrupt normal use, making it reasonable to address them in the next scheduled maintenance release.

8.1.3 | Helpdesk availability hours

The 2nd-line and 3rd-line support are available during Standard Service Time (SST), meaning 9am to 5pm CET (GMT+1), Monday to Friday, excluding bank holidays of the countries from all members of the Consortium.

8.1.4 | Service desk

For the management of incidents, service requests, and change requests, the Consortium will use the JIRA ticketing system provided and administered by Navitasoft. The platform will be accessible to Moldelectrica, N-SIDE, and Sandrologic, ensuring full transparency, traceability, and efficient coordination among all parties. JIRA will support structured issue logging, prioritization, status tracking, SLA monitoring, and reporting throughout the project implementation and support phases.

8.1.5 | Service level agreements

The table below indicates the Key Performance Indicators (KPIs) and associated Service Levels Agreements (SLAs) that will apply for SST support. As SST support is unavailable on weekends and bank holidays (of the countries from all members of the Consortium), the measurement of service level counters is paused during these periods.

KPI	Category	Severity	Target	Metrics, duties and responsibilities of each party
Initial Response Time	Incident Report	Critical	2 business hours	Elapsed time between the receipt of the email notifying the 2nd-line support of the ticket assignment, and the beginning of the resolution by the 2nd-line support agent, starting with a notification message (acknowledging the ticket's type and classification).
		Major	4 business hours	
		Minor	5 business days	
	Support Request	NA	Best effort (*)	
	Change Request	NA	Best effort (*)	

Resolution Time	Incident Report	Critical	Workaround: 2 business days Long-term fix: Best effort (*)	Elapsed time between the receipt of the email notifying the 3rd-line support, and the provision of a workaround (i.e. a solution allowing to run the tool in operations without impact on end-users) or long-term fix (i.e. corrected version). The timer will be put on-hold if the Consortium is waiting for additional information from 1st-line support or end-users to clarify or solve the incident.
		Major	Workaround: 10 business days Long-term fix: Best effort (*)	
		Minor	Workaround: Best effort (*) Long-term fix: Next yearly maintenance release	
	Support Request	NA	Best effort (*)	Elapsed time between the receipt of the email notifying the Consortium of the ticket assignment, and the provision of an answer to the request.
	Change Request	NA	Best effort (*)	Elapsed time between the receipt of the email notifying the Consortium of the ticket assignment, and the provision of an assessment of the request (impact, timeline & cost).

(*) Will be addressed with due priority and on a best-effort basis, taking into account the severity and operational impact. Target resolution timelines will be mutually agreed between the parties based on the nature and complexity of the issue, with the objective of ensuring a pragmatic, transparent, and efficient resolution process aligned with operational needs.

8.2 | Operational services

The operation of the Energy Market Management Platform will be managed by the Operators of Moldelectrica. To ensure a smooth transition, the Consortium will organize a proper hand-over, including training sessions and user documentation (e.g., user manuals).

While the daily operation will be handled by the Operators of Moldelectrica, the Consortium will provide ongoing support for configuration and parameterization.

8.3 | Maintenance services

8.3.1 | Maintenance of the software

Maintenance services for the software will be bundled in one release per year (which can be increased upon agreement during the negotiation phase - leading to extra cost) and typically include:

- **Fixing vulnerabilities** identified in yearly penetration tests (performed by external parties engaged by Moldelectrica) or by the vulnerability detection tools of the Consortium (application's dependencies and containers analysis)
- **Addressing bugs and minor incidents**, after confirmation with Moldelectrica that continuation of the operations in production is not threatened (ex: unusual but not-blocking event, cosmetic changes, small inconsistencies, edge-cases that do not disrupt normal operations, enhancement of user experience, ...)
- **Updating libraries and dependencies** to ensure security and performance.
- **Updating documentation** to align with system changes.

In addition to this yearly maintenance release, security fixes will be issued if vulnerabilities are found, following the "Vulnerability Management Policy" of the Consortium, and prioritization based on severity.

8.3.2 | Maintenance of the infrastructure

Following system Go-Live, the maintenance of the underlying hardware infrastructure (including physical servers, storage, and network equipment) will remain the responsibility of Moldelectrica. The Consortium will provide application-level support and reasonable technical assistance in case of infrastructure-related incidents impacting the software.

8.3.3 | Proposed Responsibility matrix of Warranty and maintenance period

		PLANNING	OPERATION		MAINTENANCE		SUPPORT		
IT Layers	Description	Develop & Update the Disaster Recovery Plans	Monitoring, Alarming	Backup & Archives, DRP	Configuration / Performance tuning	Update & Patches	Level 1 (L1)	Level 2 (L2)	Level 3 (L3)
Application	MMS	Navitasoft (& Moldelectrica read)	Navitasoft (& Moldelectrica read)	Navitasoft / N-SIDE / Sandrologic	Navitasoft / N-SIDE / Sandrologic	Navitasoft / N-SIDE / Sandrologic	Moldelectrica / Sandrologic	Navitasoft	Navitasoft / N-SIDE / Sandrologic
Database	MSSQL	Navitasoft (& Moldelectrica read)	Navitasoft (& Moldelectrica read)	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Microsoft Vendor

OS	Container level	Navitasoft (& Moldelectrica read)	Navitasoft (& Moldelectrica read)	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft
OS	Linux under APP	Navitasoft (& Moldelectrica read)	Navitasoft (& Moldelectrica read)	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft
OS	Virtual Machines	Navitasoft (& Moldelectrica read)	Navitasoft (& Moldelectrica read)	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft
OS	Hypervisor Proxmox	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft
OS	MS Windows Server (DB)	Navitasoft (& Moldelectrica read)	Navitasoft (& Moldelectrica read)	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Microsoft Vendor
NETWORK	Load Balancer	Navitasoft (& Moldelectrica read)	Navitasoft (& Moldelectrica read)	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft	Navitasoft
Network	WAF	Moldelectrica (& Navitasoft read)	Moldelectrica (& Navitasoft read)	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica
Network	Internet Connection	Moldelectrica (& Navitasoft read)	Moldelectrica (& Navitasoft read)	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica
Network	Network setup	Moldelectrica (& Navitasoft read)	Moldelectrica (& Navitasoft read)	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica
Network HW	Network – HW	Moldelectrica (& Navitasoft read)	Moldelectrica (& Navitasoft read)	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica
HARDWARE	Server - HW	Moldelectrica (& Navitasoft read)	Moldelectrica (& Navitasoft read)	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica
Hardware	Storage - HW	Moldelectrica (& Navitasoft read)	Moldelectrica (& Navitasoft read)	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica	Moldelectrica

8.4 | Change management

New features, add-ons, scripts, interface modifications (ex: change required in the external APIs), modification in the infrastructure, or any other modification of the functional and non-functional scope will be handled through a formal Change Control process, already described in section 6.4, leading to extra fixed fee and recurring fee proportional to the services requested (ex: documentation, implementation, testing, training, ...).

These change releases are delivered in addition to the planned yearly maintenance releases and any ad-hoc security fix releases. The Consortium may also choose to bundle certain maintenance tasks into change releases when it improves efficiency and minimizes disruption.

8.5 | Release management

The release management approach will ensure minimal disruption while enabling seamless deployment of new versions of the Energy Market Management Platform:

- **Content and timeline:** The content and timeline of upcoming releases are communicated in advance to Moldelectica, who will be responsible for informing the relevant stakeholders. The notification period will be agreed upon upfront and may differ depending on the type and urgency of the release (maintenance, change, security fix, ...).
- **Deployment and configuration:** The Consortium will provide an installation manual to allow the IT team of Moldelectrica to autonomously deploy and configure new versions after the go-live. It is assumed that this IT team will manage all infrastructure aspects, including configuration, deployment, monitoring and maintenance. While the Consortium does not handle deployment or production configuration, we are committed to supporting smooth integration by assisting them during those activities (especially for the first deployments), within reasonable limits.
- **Documentation:** User manuals and comprehensive release notes accompany each release, ensuring users understand the updated tool effectively.
- **Testing:** New releases will have to be first deployed in a test environment, where Moldelectrica is responsible for testing the release before its deployment in production.

We strongly encourage installing new releases in production as soon as they are validated to benefit from the latest features and bug fixes. We support the

previous major version for 12 months following the public release of a new major version.

9 | Conclusion

The Consortium and the local partner bring together a unique combination of market expertise, advanced technology, and proven implementation experience that makes us particularly well positioned to successfully deliver Moldelectrica's Market Management System.

By combining N-SIDE's recognized expertise in electricity market design and optimization — including deep knowledge of balancing markets, cross-border mechanisms, and European market integration — with Navitasoft's strong capabilities in system integration, software delivery, and project management, and Sandrologic's infrastructure and technical support expertise and knowledge of the Moldavian's electricity landscape, we offer a comprehensive and cohesive solution. Our teams have hands-on experience delivering operational systems for Transmission System Operators and market operators under strict availability, security, and regulatory constraints.

Beyond technical competence, we provide a structured and pragmatic implementation approach, clear governance, transparent communication, and controlled risk management. Our methodology ensures that the solution will not only comply with the functional and non-functional requirements of the tender, but will also be delivered in a predictable, controlled, and sustainable manner. The proposed platform is based on proven components already operating in other environments, thereby reducing implementation risks and ensuring reliability from day one.

We understand the strategic importance of this project for Moldelectrica and for Moldova's continued integration into the European electricity market. Our objective is not only to deliver a compliant system, but to establish a long-term, trusted partnership that supports Moldelectrica's operational excellence and future market evolution.

For these reasons, we are confident that our Consortium represents the most reliable, experienced, and future-proof partner to successfully implement

10 | Signature

N-SIDE SA

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Title: CEO

Date: avril 9, 2026

Place: Louvain-la-Neuve

Signature:

Signé par :
Quentin Grutman
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Navitasoft Zrt

Name: Zoltan Hadju

Title: CEO

Date: April 9, 2026

Place: Budapest

Signature:

Signed by:
Zoltan Hadju
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Sandrologic Group

Name: Serghei Takovsk

Title: CEO

Date: April 9, 2026

Place: Chisinau

Signature:

Signed by:
Serghei Takovsk
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