Hydrogen Demo Valley

Pre-Feasibility Study

Duty Specification for

SUPERVISORY AND CONTROL/SAFETY SYSTEM

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1. INTRODUCTION

ENEA, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development, has planned the realization of a Hydrogen Demo Valley (HdV) inside the research facility located at "La Casaccia", in the municipality of Rome (Italy). Such infrastructure will act as an incubator of technologies and services related to the entire hydrogen value chain, and is expected to be completed in May 2024.

T.EN Italy Solutions SpA has been awarded the preparation of a pre-feasibility study aimed at defining the scope and the execution model for the subsequent design phase and construction activity.

2. SYSTEM DESCRIPTION

This duty specification defines the minimum requirements for the Supervisory and Control/Safety System to deliver Hydrogen Demo Valley operations management system, according to the Supervisory and Control/Safety Architecture.

The Supervisory and Control/Safety System shall have as minimum the following equipment:

- Remote I/O
- SCADA
- Safety PLC
- Network equipment (Switch, FireWall, etc.)
- Engineer/Operator Station (each one's with 2 monitors)
- Others Server

3. SUPERVISORY PHILOSOPHY

The System shall allow the data acquisition and historicization from each Packages, and shall also allow its processing and sharing as shown in the System Architecture.

In the next engineering phase, data management will be detailed in accordance with ENEA requests.

4. CONTROL PHILOSOPHY

The System shall have an adequate level of automation for the Packages interactions regulation, to reach HdV management in safety and minimizing the operator actions.
Each Packages will be equipped with its own PLC which will acknowledging the System requests and autonomously manage the Package.
Therefore, it's not required to perform real-time control functions by the System, the Packages process control will be carried out by the respective PLC.
In the next engineering phase, will be developed the System Control Narrative, with the Packages technical functional requirements.
For the HdV efficiency optimization, the System shall allow the control logics development also by ENEA operators, with the supplier support, based on the available electricity (produced from renewable sources) and in relation to the users demand.

5. C&E MATRIX

In the next engineering phase, the cause and effect matrix diagram (C&E Matrix) will be developed according to the project safety requirements.
The System shall be equipped with a PLC and SIL-3 Remote I/O to achieve the safety functions required with each Packages that will be identified in the next engineering phase.

6. SYSTEM SPECIFICATION

Main characteristics:

- The System shall be Web based System and the System shall be easily accessible through use of web browsers.
- System's operation and maintenance shall not be dependent on license renewal.
- The supplier shall guarantee to support all System hardware, firmware, and software with spare parts and services.
- The System must be equipped with an UPS (Uninterruptible Power Supply) local unit that guarantees its operation even in case of blackouts, it also shall be possible after loss of power and restoration of power to reboot automatically with operating system and system database

without user intervention.

- The System shall be capable of updating calculation algorithms, and dynamic fields of the displays of actual recent event received at the system from field unites.
- The System shall support Open Industry Standard protocol(s) such as Modbus TCP/IP, DNP3, OPC UA, etc. and the most popular PLC protocols.
- The System shall support hardware and software redundancy as standard offering.
- The System shall be modular in design, this means the same hardware is used for small, medium and large configurations, with expansion being based on adding components.
- It shall be possible to expand the System by adding additional servers and RTUs, Remote I/O without the need to shut down the System during the expansion process.
- The System shall support distributed network equipment such as terminal servers, communication servers, network printers, network workstations, mass storage/backup devices, using non-proprietary industrial standards such as Ethernet (i.e., TCP/IP).
- The System provide an API witch shall allow third party applications written in Java, C, C++, C# or VBA access to tag, alarm and trend data.
- It shall be possible to support more than one engineering workstation in the system.
- It shall be possible to perform all configuration, database generation, graphics building/editing, and software linking/compiling from any engineering and operator workstation.
- It shall be possible for supervisory and control applications to be scheduled, run on demand or triggered by events, communicate set point and manage the interaction between to all packages PLC connected to the System.
- There shall be a summary display of active system alarms.
- The Alarm and Events Management module shall allow alarms to be presented on several different devices, such as: Workstations, Printers, Smartphones and PDAs, Paging systems, Acoustic devices.
- There shall be a configurable, real time and historical data collection module as a standard integrated functionality to support trending, logging, and reporting.
- It shall be possible access to real-time and historical data of each package, reports and trending, through ENEA LAN and Internet using appropriate access keys.
- The HMI shall be developed in HTML5 format, or, preferably, the System shall provide a conversion utility to export HMI displays in HTML5 format, so that it could be operated by small

form factor displays, such as a mobile phone or tablet, allowing access to information anywhere at any time.

- All displays and graphics that show real time data shall be automatically updated when the display or graphic is on a screen.
- It shall be possible for the ENEA operators customize the System (modify interfaces, tags, add variables, etc.) previous training by the supplier.
- If required, the supplier shall be able to certificate the SIL loop foreseen by SIL allocation study.
- Compliance with Italian legislation.

7. SCOPE OF SUPPLY

Supplier is expected to propose the entire the Supervisory and Control/Safety System, in particular the System shall be according to the System Architecture and the following main requirements:

- SCADA system (Hardware and software): the supply shall include everything necessary include server, switch, engineer station, operator station, software, etc.
- PLC/SIL-3 with open industry standard protocols (such as modbus TCP, DNP3, OPC, etc)
- N.2 Remote I/O with the following I/O characteristics:
  Safety SIL 3 Digital Output: 3 PKG x 8 DO/PKG = 24 DO
  Safety SIL 3 Digital Input: 3 PKG x 8 DI/PKG = 24 DI
  Redundant Serial Connection to Package: 3 PKG x 2 Serial/PKG = 6 Serial (IP)
  Serial Analog/Digital I/O Signal from/to Package: 3 PKG x 125 Signal/PKG = 375 Signal
- N.2 Remote I/O with the following I/O characteristics:
  Safety SIL 3 Digital Output: 1 PKG x 8 DO/PKG =8 DO
  Safety SIL 3 Digital Input: 1 PKG x 8 DI/PKG =8 DI
  Redundant Serial Connection to Package: 1 PKG x 2 Serial/PKG = 2 Serial (IP)
  Serial Analog/Digital I/O Signal from/to Package: 1 PKG x 125 Signal/PKG = 125 Signal
- Interconnection cable infrastructure (from Package to Remote I/O):
  Fiber-optic (single mode, 8 core minimum): 8 PKG x 250m/PKG x 1.2 = 2400 m
  Hardwired (2x12x1,5 copper): 8 PKG x 250m/PKG = 2000 m
- Customized Process Graphic Interface: 8 PKG x 3 Page/PKG + 8 = 32 Page

- Standard Office Desk with 2 office armchairs n.2
- Enclosure 19" 800x800x2000 n.2

Note:

PKG Package

IP Internet Protocol

8. REQUESTED INFORMATION

Supplier shall submit a technical and commercial proposal to include:

- Dimensions and weight.
- Maintenance requirements with expected Opex.
- Schedule for design, construction, and delivery of the System.
- Budgetary offer for purchase, lease or right to use.
- Remote I/O panel addiction extra costs (without I/O card).
- I/O Card addiction extra costs, with the following requirements:

  Safety SIL 3 Digital Output 8 DO;

  Safety SIL 3 Digital Input 8 DI;

  Redundant Serial Connection 2 Serial (IP);

  Serial Analog/Digital I/O Signal 125 Signal.
- Commissioning times and costs.
- Reference list.
- Battery limits summary.
- Delivery and commissioning times.

9. ATTACHMENTS

- HdV Supervisory and Control/Safety System architecture.
- HdV block diagram.