Internship Report

Sizing and integration of IRVE terminals on the ENEDIS distribution network

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BUT GEII **Academic Year 2023-2024**

ACKNOWLEDGEMENTS

Before detailing this professional experience, it seems appropriate to begin this internship report with acknowledgements to those who taught me a lot during this internship, and even to those who kindly made this internship a very profitable moment.

I would also like to thank all the office employees, especially my professional tutor, Mr. Xavier BREBION, for advising and guiding me in the field of project management, the head of the division, Mr. Fidèle NEYA, for accepting to host me within the Engineering division, as well as my academic tutor, Mr. Larbi CHRIFI-ALAOUI, for his trust, listening, and support throughout this internship.

I extend my gratitude for their professionalism in our interactions, their personalized advice, their respective conduct, and the information they allowed me to glean from their activities over these two months.

Warm thoughts also go to my loved ones, family members, and friends who continuously supported and encouraged me in all my endeavors, both professionally and personally.

Finally, a special thanks to Mr. Jeremy COLLET and Mr. Xavier BREBION for the time spent helping me in the writing of this internship report.

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INTRODUCTION

As part of my second year in the BUT in Electrical Engineering and Industrial Computing (GEII) at the IUT of Aisne in Soissons, I had the opportunity to undertake a two-month internship at ENEDIS, a leading company in the field of electricity distribution in France. This internship, which took place from April 15 to June 21, 2024, allowed me to put into practice the theoretical knowledge acquired during my studies and to develop new technical skills.

My main objective during this internship was to gain practical experience in sizing and integrating IRVE terminals on the ENEDIS distribution network. I was also interested in discovering the role of a project manager and the work methodologies in a professional environment.

This report details my activities and achievements over these two months at ENEDIS.

First, we will present the company ENEDIS, as well as its various products and services. Then, we will define my tasks and responsibilities, describe my experience, and finally, conclude with the lessons learned and skills acquired. I hope this report provides valuable insight into my internship experience and my professional growth.

IDENTIFICATION SHEET

Corporate Name	ENEDIS
Date of Establishment	January 1, 2008
Revenue	15 billions euros
Workforce	38,507
Phone Number	09 70 83 19 70
Address	Pl. d'Alsace Lorraine, 02200 Soissons
Website	Accueil | Enedis
Activities	Manager of the electricity distribution network in France

Presentation of ENEDIS

a) Organizational Chart and Technical Services

ENEDIS, the manager of the public electricity network in France, is structured to effectively meet the expectations of its clients and partners. The company's governance is ensured by two main bodies: the executive board and the supervisory board. The executive board has the broadest powers to represent the company in all situations, ensuring proactive and reactive management. Meanwhile, the supervisory board continuously monitors the management carried out by the executive board, contributing to the independence and efficiency of ENEDIS's governance.

The executive board includes key members such as the Chairwoman of the Executive Board, Mrs. Marianne Laigneau, the Client and Territory Director, Mr. Christian Buchel, the Technical Director, Mr. Hervé Champenois, among others, who together make strategic decisions for the company.

Marianne Laigneau - Chairwoman of the Executive Board

The supervisory board comprises representatives from various sectors, including company employees, elected by their peers, and appointed members to ensure diversity and inclusiveness in decision-making. Mrs. Véronique Lacour is the president and Mrs. Catherine Bauby is the vice president.

The company also has a diversified technical organization to meet the requirements of its customers and partners. Services departments are divided into several departments, each with a distinct specialization, thus ensuring complete coverage of needs operational and strategic aspects of the company. These departments include:

• Management support

•Territories

•Human resources

• Communication, Innovation, Digital & Collaborative

• Occupational Health and Social Partners Prevention

• BAG Performance Management

• Customer relations Linky development

• APACHE Engineering Connection

•Operations

• Heritage Infrastructure

In the PICARDY region, there are 9 Enedis agencies in total. In particular, to:

- St Quentin, Chambry, Soissons, Château-Thierry (in the Aisne)

- Beauvais, Nogent sur Oise, Margny-lès-Compiègne (in the Oise)

- Abbeville, Amiens (in the Somme)

Each technical department of these different agencies is headed by a Head of the division and sometimes one or more Deputies to the Chief.

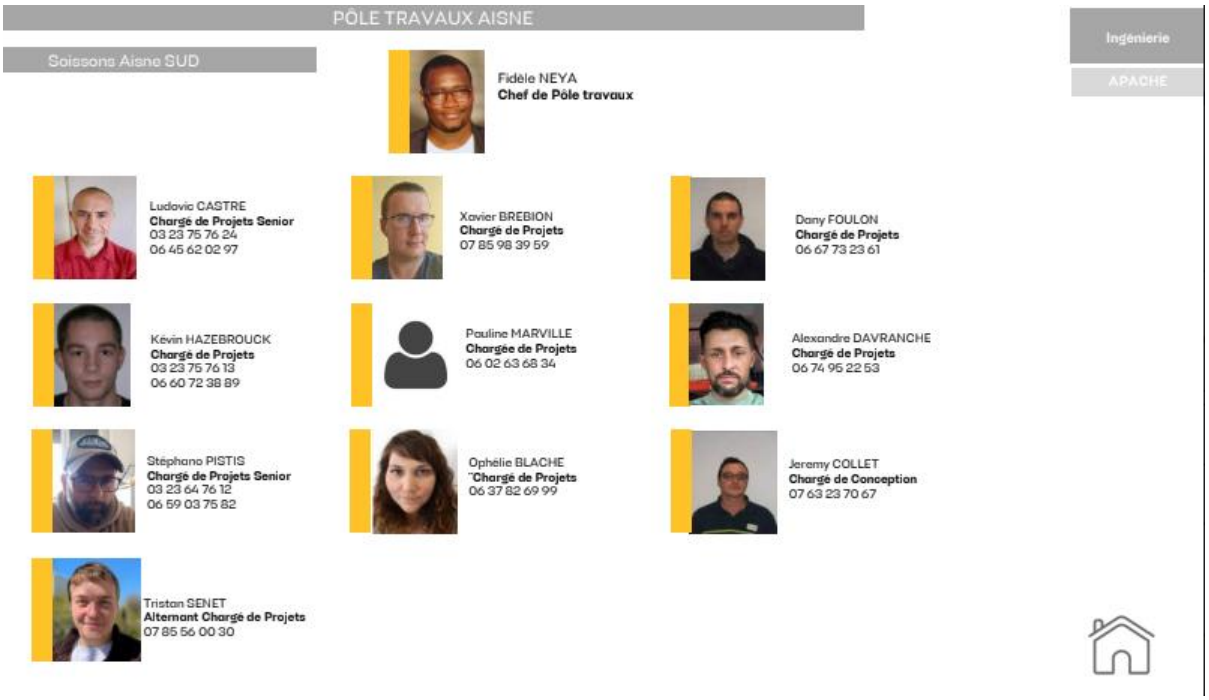
Within the Engineering sector in Soissons where I did my internship as a project manager, The team is made up of dedicated professionals and led by a **division manager works**, Fidèle NEYA. The team also consists of:

• **2 Senior Project Managers:** Ludovic CASTRE and Stéphano PISTIS

• **6 Project Managers:** Kévin HAZEBROUCK, Xavier BREBION, Pauline MARVILLE, Ophélie BLACHE, Dany FOULON, Alexandre DAVRANCHE

• **1 Design Manager:** Jeremy COLLET

• **1 Work-study Project Manager:** Tristan SENET



Members of the Soissons engineering department

Each member plays a crucial role in the management and execution of projects, ensuring that connection and engineering operations are carried out with expertise and in accordance with ENEDIS' high standards.

For more information on ENEDIS's organization and governance, you can check out their official website.

b) Financial Context

Between its creation in **2008** and **2017**, Enedis invested over 30 billion euros in various components of the network. In **2017**, the investments amounted to 3.769 billion euros. These investments notably reduced the average outage time from about 80 minutes in 2008 to 65 minutes in 2017.

These investments also cover the control and automation systems of the network, sometimes referred to as "**smart grids**." Thus, Enedis has 31 regional network control centers on the mainland. They allow for continuous monitoring of the network's condition, identification of incidents, and remote maneuvering of the medium voltage network, especially to quickly restore power to subscribers in case of an incident. Finally, the deployment of the Linky smart meter, which will continue until 2021, enables daily consumption readings, low voltage network monitoring, and the performance of certain operations remotely, without personnel deployment, for common tasks such as activating or deactivating service during moves or adjusting the subscribed power capacity.

Enedis "network development plan" for 2023 anticipates an increase of about 20% in its investments for the period 2022-2032 to exceed 5 billion euros annually, which is 75% more than the historical annual average observed between 1980 and 2020. These investments will total 96 billion euros by 2040. This increase is primarily due to the growing demands for connections of new installations: the number of charging stations connected to its network will rise from 0.8 million at the end of 2021 to 13 million in 2040, wind turbines from 16 GW to 28 GW, and solar from 12 GW to 42 GW. These new installation connections also sometimes involve significant network reinforcement operations. The peak of investments is expected to be reached in 2027, given the need to equip collective building parking lots with electric vehicle charging stations. To finance these investments, Enedis plans to increase its debt but also to

ask for a stronger contribution from consumers via the public electricity network usage tariff, subject to approval by the Energy Regulatory Commission.

Equity	▲ 6.3 billion in 2021
Turnover	▲ €15.6 billion in 2021
Net income	▲ €1.2 billion in 2021

c) Business Environment

The business environment of Enedis is characterized by an open and competitive electricity market, regulated by the Energy Regulation Commission (CRE). Since July 1, 2007, the European electricity supply market has been fully open to competition, allowing businesses and individuals to choose their electricity supplier.

Enedis, as the distribution network manager, does not produce or sell electricity but transports electricity to users. Electricity production is ensured by competing companies throughout the territory, and transportation is managed by RTE (Electricity Transmission Network).

Regarding Enedis' competitors, competition mainly operates at the local level, with local distribution companies that can offer similar services. However, Enedis does not have to fear aggressive competition imminently, but must remain strategically vigilant.

End customers are free to choose their suppliers on the market, and some electricity producers are also suppliers. Additionally, Enedis collaborates with approximately 3,700 providers in various fields such as network works, electrical equipment, tertiary and intellectual services, as well as IT and telecommunications to fulfill its public service missions. The company has established contracts with electricity suppliers offering a single contract for electricity supply and its delivery on the public distribution network. These suppliers must sign a GRD-Supplier (GRD-F) contract with Enedis. The GRD-F contract outlines the rights and duties of the supplier and distributor regarding access and use of the Public Distribution Network (RPD), and the exchange of necessary data for implementing these Single Contracts.

Some electricity suppliers who signed a GRD-F contract with Enedis as of June 1, 2024, include:

- ENGIE
- ELECTRICITÉ DE FRANCE (EDF)
- ALLEGO FRANCE
- ALPIQ ENERGIE FRANCE
- ALTERNA
- AUCHAN ENERGIES
- EKWATEUR
- HYDRONEXT
- VOLTERRES
- SOWEE

This creates a dynamic environment where Enedis must maintain a high quality of service and respond effectively to the needs of consumers and communities.

Description of Tasks and Missions

During my internship at Enedis in the engineering department, I had the opportunity to get involved in various significant tasks that contributed to my professional development. Apart from the main project on sizing and integrating EV charging stations, I collaborated with the maintenance team to identify and resolve technical issues on the network, which strengthened my understanding of operational challenges. In addition, I attended internal meetings with members of the engineering department held every Tuesday, called Short Loops (Boucle Courte in French or BC). These meetings aim to provide a comprehensive review of the previous week and the company's performance by highlighting accidents and near-accidents that occurred as well as feedback from customer satisfaction. They also address information related to human resources and conclude with a round table during which each participant expresses their thoughts. The BCs offered me a valuable insight into the decision-making processes within the company. These diverse experiences allowed me to develop a global vision of the energy sector and its challenges.

I also accompanied one of my colleagues on the various construction sites he had to manage. We participated in site visits to supervise the work and ensure the compliance of the installations with the plans and technical specifications. We took measurements of a trench for the connection of electric vehicle charging stations in the DECATHLON parking lot in Soissons and for the installation of a C4 cabinet in a field. We also checked the necessary space to place a cabinet intended for a community. As a reminder, a trench is a long ditch dug in the ground through which the service providers will pass the cables to be connected. I would like to emphasize that during the period of my internship, the company did not receive many requests on the IRVE which forced me to follow more cases related to cable burials (passage of the aerial cable in the ground after having dug the trench) or cabinet installations, generally C4.

In addition, I checked the size of a cabinet to determine the possibility of passing a new cable through it to reconnect to the network to power a farm. I also learned about the importance of assigning unique numbers to each post, cable, and other equipment before ordering and depositing them. These equipments are all equipped with GPS sensors that allow the members of the engineering department to locate and recognize them on a software called E-PLANS, like Google Maps but internal to ENEDIS. The company can therefore follow in real time everything that happens with all its equipment and thus ensure effective maintenance when necessary. Apart from that, I assisted in the implementation of technical solutions (on the RACING software) for cases involving aerial cables and the addition of cut-off posts on an existing line, in collaboration with a study manager and the owner of the concerned land. These cut-off posts were not a request from a client but simply a deliberation by Enedis who judged the network too long. The advantage of placing a cut-off post is that it allows to segment the electrical network into several sections. In case of maintenance or repair, it is possible to isolate a specific section without interrupting the power supply to other parts of the network. It also ensures the safety of the interveners by allowing to cut off the electrical supply in a controlled manner. This avoids accidents related to working on live lines. These experiences have given me a deep understanding of the technical challenges associated with electrical engineering projects.

I also spent a week at the **Operational Base** to briefly discover the activities carried out there. During this stay, I was able to:

- Participate in different workshops whose goal was to prevent workplace safety, then to address the subject of relationships in the company and some work methods specific to the **Live Line Workers** (Travailleurs Sous Tension in French or TST) of the Operational Base.

- Go out in the field with the LLWs to isolate two phases of the network that were coming into contact and causing short circuits because their protections had deteriorated.
- Go out in the field to install a new electric pole to shorten the distance of cables used and save on them.
- Change network modules in the city's transformers.

ANALYSIS

a) Technological and scientific contributions

This internship at Enedis allowed me to learn more about the tools and software used by the company as well as their working methods. These tools allow for sizing and help with simulation to assess the impact of the integration of charging stations or any element on the electrical network. I was also able to learn more about workplace safety, especially with Live Line Workers who required me to wear PPE (Personal Protective Equipment) as long as I am on the construction site. These contributions have allowed me to develop a solid technical and scientific expertise in the field of energy in general but also in the field of charging infrastructure for electric vehicles, while actively contributing to innovative and strategic projects for Enedis.

b) Social, moral and corporate contributions

This internship has been beneficial to me not only on a technological and scientific level, but also on social and moral aspects. Indeed, I was integrated into a team where human values are paramount. A mutual trust and a spirit of solidarity reign among the members, each having an unshakeable faith in the work of the other, which constitutes the strength and good understanding of this team. I also realized that every mission accomplished by the team members is crucial for the smooth running of the company and that one must be minimally autonomous without necessarily waiting for orders from a superior before making decisions. I also learned to be more rigorous and organized in my work, because without that one can very quickly get lost in what one does.

c) Barriers and solutions

Here are some of the problems I have observed during my internship:

- Problem: Poor communication among team members, or with other stakeholders can lead to misunderstandings and delays.
- Solution:
    - Regular Meetings: Implement weekly meetings to review the progress of the project, clarify expectations, and resolve outstanding issues.
    - Use of Communication Tools: Use project management and communication tools like Microsoft Teams to facilitate exchanges and track tasks.

- Problem: I have encountered difficulties due to a lack of knowledge or practical experience with certain tools or technologies.
- Solution:
    - Continuing Education: Participate in internal or online training to improve technical skills.
    - Mentorship: Seek help and advice from more experienced colleagues. Do not hesitate to ask questions and request detailed explanations.

- Problem: Difficulty integrating into the existing team, which can affect collaboration and work efficiency.
- Solution:
    - Team Activities: Participate in social and professional activities organized by the company to get to know colleagues better.
    - Opened Communication: Encourage open and honest communication, be proactive in interactions, and show interest in other people's projects and ideas.

CONCLUSION

At the end of my internship within the engineering department of Enedis, dedicated to the sizing and integration of IRVE charging stations on the distribution network, I was able to observe the challenges and opportunities related to the deployment of this rapidly expanding technology. This internship offered me a rich and instructive immersion in a booming sector, aligned with contemporary issues of energy transition and sustainable mobility. The various missions I carried out allowed me to develop a deep understanding of the technical and operational aspects related to the installation of charging stations. In parallel with my main project, the workshops, the Short Loop meetings, as well as the technical support provided to the field teams enriched me both professionally and personally. This experience allowed me to acquire valuable skills in project management, technical analysis, and communication. I was also able to understand the security and confidentiality issues inherent in the management of electrical infrastructures.

I would like to express my gratitude to the entire Enedis team in Soissons for their warm welcome within their various departments and their constant support throughout this internship. Their expertise and dedication have been sources of inspiration and have greatly contributed to the success of my project. This internship has been a decisive step in my professional career, confirming my interest in the renewable energy sector and electric mobility. I am now determined to actively contribute to the energy transition and possibly pursue a career in this promising field.

BIBLIOGRAPHY

Enedis Official Website: Accueil | Enedis

Explanatory video of Enedis' journey:

https://youtu.be/oJyyHXTC4cY?si=3Txl9_ETE--_SuBd

Documents used for the writing of the internship report:

- Report Writing Tips
- Examples of internship reports

Software and documents used in the company: Unfortunately, I am not able to provide these screenshots and documents in view of the company's privacy policy