New Na-ion cells to accelerate the European Energy Transition

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875629

What NAIMA is?

NAIMA project is a European project designed to develop and validate a new generation of Sodium-ion (Na-ion) based batteries to unseat the current Li-based technologies.

The European Union is transitioning to a secure, sustainable and competitive energy system based on renewable sources. The flourishing of a wide portfolio of renewable energy installations is allowing the deployment of large to small scale industrial electricity grids, and an increased share of electricity produced in private households. In these business scenarios the role of the energy storage techonologies is crucial.

At present, the European industry depends on the import of Asian Lithium-ion batteries. For this reason, it is crucial to create a new industry value chain capable to ensure the production and supply of 100% European batteries. The NA-ion technology is already supported by a solid European battery value chain, preserving the ownership and industry strength around European countries

With an overall budget of 8 million euros funded by the European Commission through the Horizon 2020 programme, NAIMA, which began on 1st of December 2019, will gather 15 partners working together until November 30th, 2022.

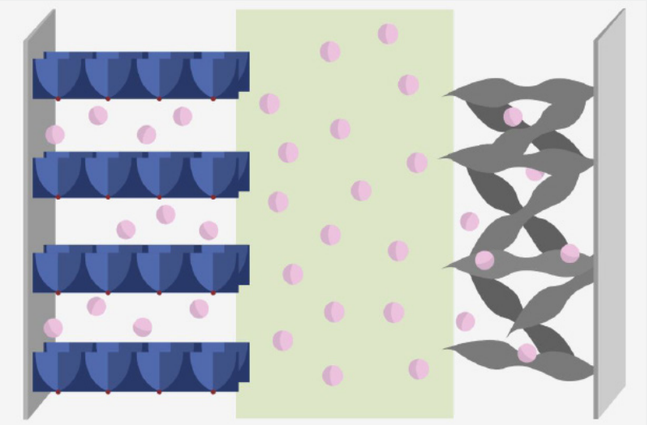
The NA-ion Cell Concept

The NAIMA project is conceived to develop and test 2 configurations of enhanced Na-ion cells to satisfy the main energy storage system applications demanded by the end-users of the stationary energy sector.

This novel concept becomes a reality configured in the following 2 cell designs:

1) High power and fast charge design concept (120Wh/kg; 250Wh/l; 5000W/kg; 8,000 cycles; >50% recycling rate; 0.05/kWh/cycle and ++Safety)

Created by the combination of polyanions, optimized electrolyte and bio-based hard carbons to satisfy the end-user's needs of renewable generation farms (Farm Operators, DSOs and TSOs are the main players) and industry plants (All TIERs of manufacturing and process industry value chains which production processes require high electricity demands (intensive, peaks, etc.)



Positive electrode - Cathode **Electrolyte** **Negative electrode - Anode**

2) Low cost and energy design concept (200Wh/kg; 420Wh/l; 500W/kg; 6,000 cycles; >50% recycling rate; 0.04/kWh/cycle and ++Safety)

Conceived by the integration of lamellar oxides, optimized electrolyte and bio-based hard carbons to satisfy end-user's needs of private households (building owners committed to dedicate investment in renewable energy installations to satisfy their energy consumption are end-users).

Business Scenarios

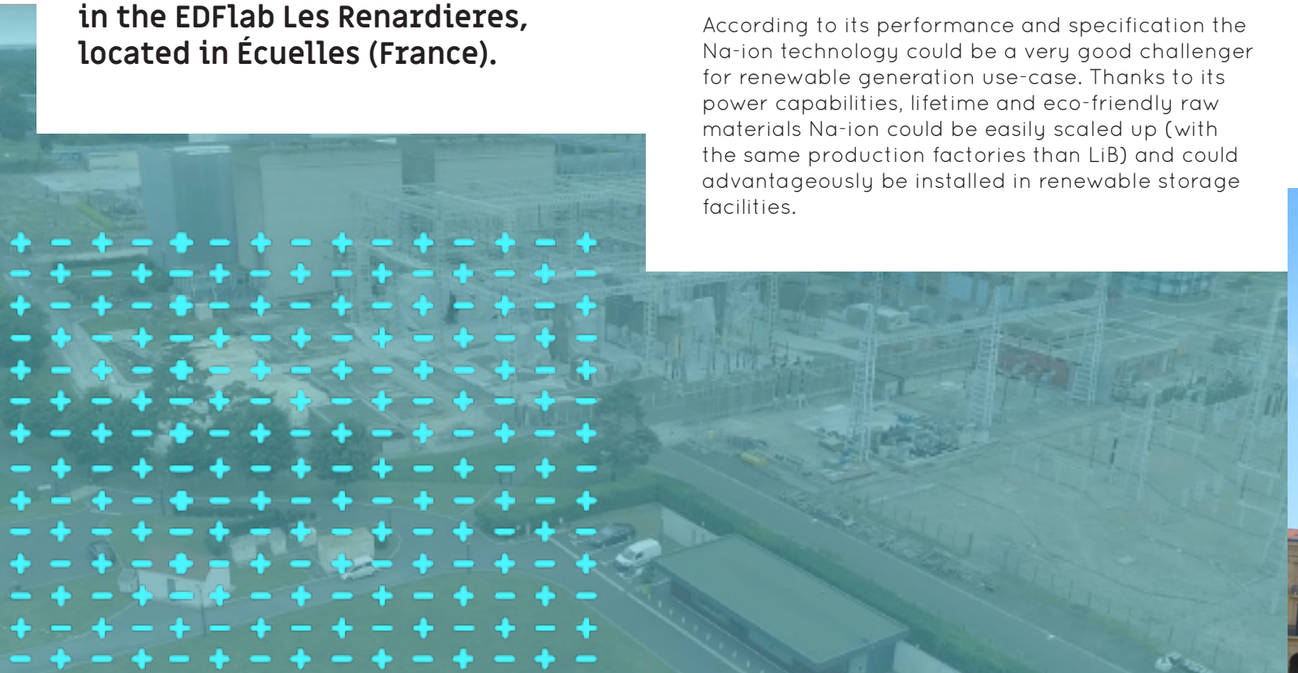
NAIMA will provide solid evidences about the competitiveness of the new technology in 3 energy storage system environments through the application of an assessment and monitoring protocol that will be tested in 3 multi-scale Business Scenarios (BS).

Renewable generation application

GREEN SIB prototype dedicated to renewable generation will be tested in the EDFlab Les Renardieres, located in Écuelles (France).

The module will be tested in lab using a DC system and simulating the use in a real system. The prototype performance will be simulated, and the calculated solicitation profile will be applied to the system.

According to its performance and specification the Na-ion technology could be a very good challenger for renewable generation use-case. Thanks to its power capabilities, lifetime and eco-friendly raw materials Na-ion could be easily scaled up (with the same production factories than LiB) and could advantageously be installed in renewable storage facilities.



Industry Scenario

Blue SIB prototype for industrial applications will be tested in different factories of Gestamp, located in Navarra (Spain).

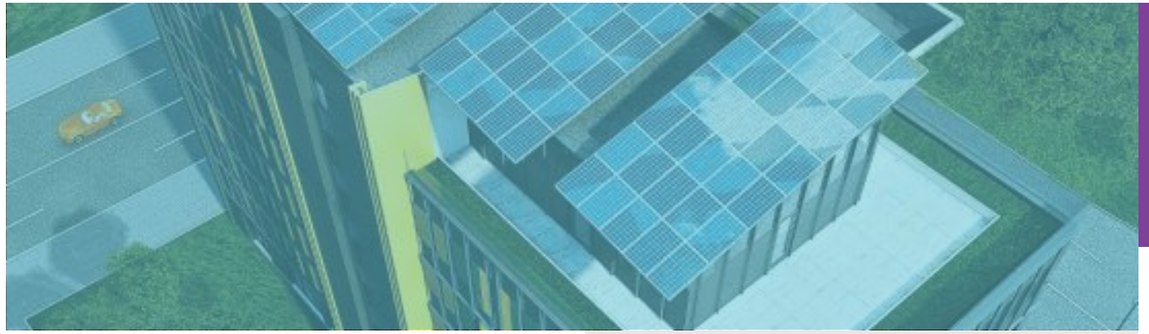
Industrial production is a crucial pillar of the European economy and remains a key driver for economic growth and job creation. At present, industry is experiencing the Fourth Industrial Revolution known as Industry 4.0. This new paradigm has its own challenges and require efficient and safe powering.

In this context, NAIMA solution, capable of handling high charging current and to deliver high currents, will suit to the industry needs in terms of power supply.

To validate the application for industry, the industrial components manufacturer Gestamp will be in charge of testing two units of the Blue SIB prototype in two different plants of the company.

The different processes involved in both plants have different energy consumptions. The firm counts with an Energy Management System based on Big Data, which allows real-time monitoring of energy consumption needs enabling to connect the plants' infrastructures to a solution in the cloud offering an instant diagnosis of electricity and gas consumption, and, which allows to have a detailed visualisation of the consumption of certain points for their analysis.

Consortium



NAIMA brings together a strong and complementary consortium, including 15 partners from 7 European countries. The interdisciplinary profiles of the partners offer an appropriate balance covering the entire value chain and diverse fields required in the project.

Private Household Scenario

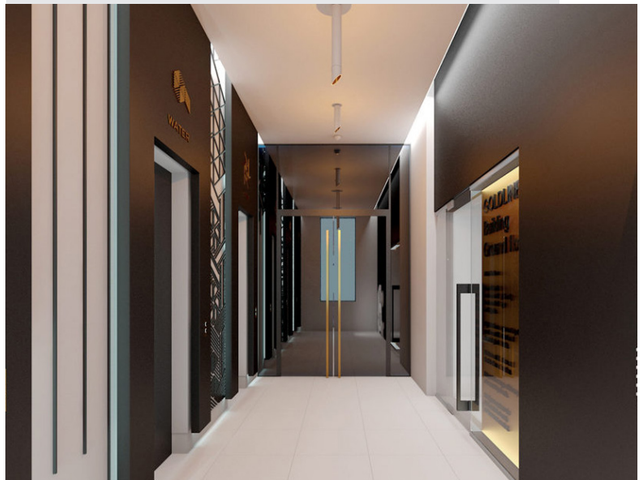
The Yellow SIB prototype, aimed to private households, will be tested in Sofia (Bulgaria).

NAIMA Project will enable a specific solution for households based on the lamellar oxide families as this family focuses on low-cost materials that can cycle thousands of cycles, a feature that has been seldom demonstrated so far.

Goldline partner will provide a demo site for the two units of SIB prototypes addressed to household BS. The site will consist of an office building with a roof-top with PV panels and storage units, while there is a private transformer and independent interconnections with the distribution grid.

The building also has EV charging stations, energy efficient elevators, LED lighting and HVAC. Some of the innovative features of the building are:

- Reliable top-level elevators
- Natural light, active sunshades and adaptive LED lighting
- Stimulation of the use of environmentally friendly vehicles.
- Care for the most valuable natural resource – water.
- Modern monitoring practices and analysis of energy consumption.



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