

DONES Implementation and next steps



The need for a facility of this type was identified long time ago and work has been carried out by using different frameworks. **In the last 15 years, key projects are:**

IFMIF/EVEDA
(included in the BA)



Design and
Validation Activities



Obtaining results: design seems feasible

WPENS
(EUROfusion WP)



Design and
Validation Activities



Defining the design: close to the objective!!!

DONES-PreP
(EURATOM CSA)



Elaborate and draft the
international
consortium agreement



Finished: international implementing scheme defined

DONES-PRIME/UGR
(Spanish projects)



Engineering and
Construction Activities



Starting the work on site (first auxiliary buildings)



**DONES-PRIME
DONES-UGR**

Validation Phase (IFMIF/EVEDA)
2012-2026

Design and Engineering Phase
2015-2020, 2021-2027

Site Selection Process
2016-2018

Preparatory Phase (DONES PreP)
2019-2021

Construction, Installation, Testing and
Systems Commissioning Phase

Plant Integrated Commissioning

Operation Phase

Decommissioning Phase

DONES Program Mission

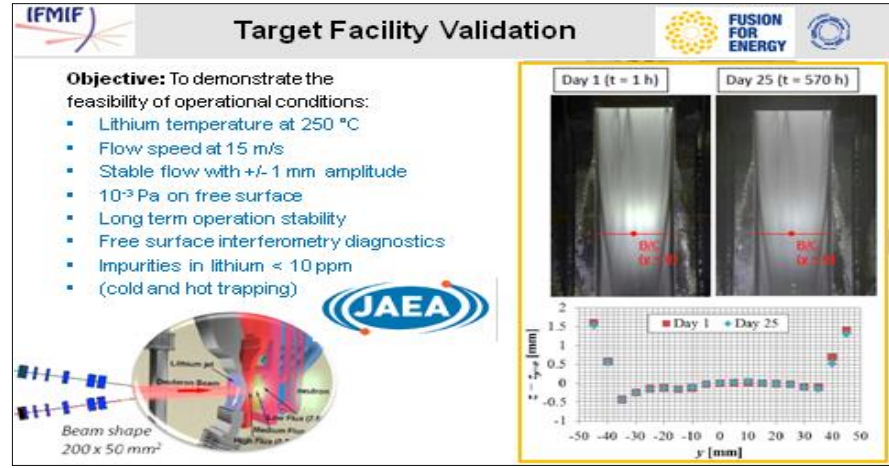
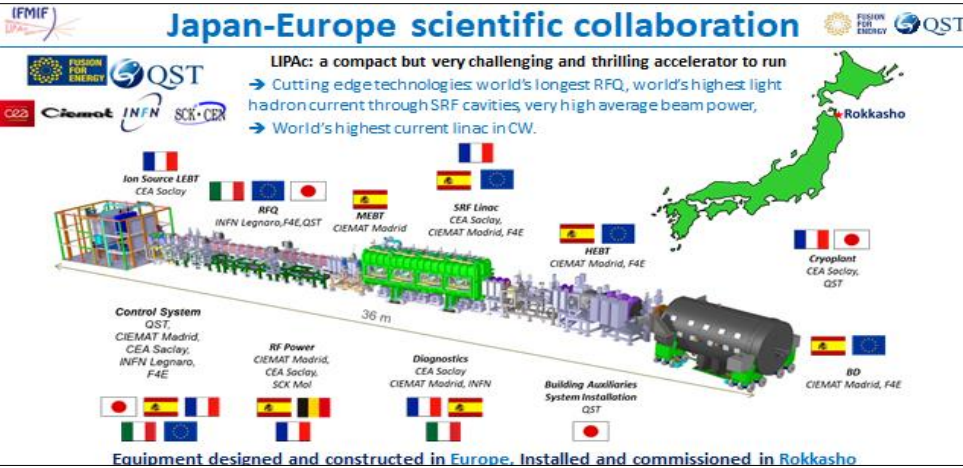
To develop a data base of fusion-like neutron irradiation effects in fusion materials

DONES Program Objectives

- To provide a neutron source producing high energy neutrons at sufficient intensity and irradiation volume.
- Generate materials irradiation test data for DEMO
- Generate data base for benchmarking with computational material science
- To develop a Complementary Experiments workprogram

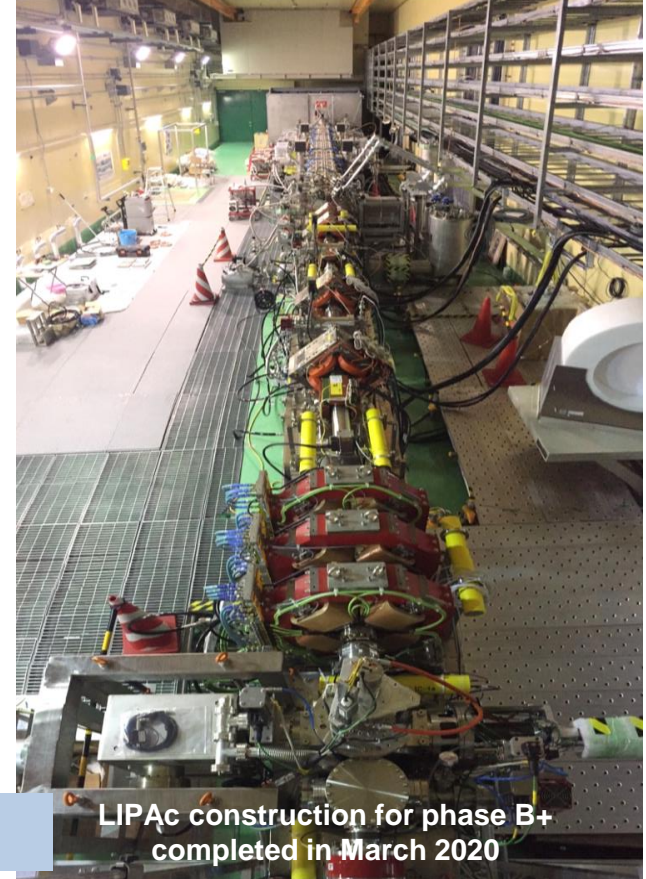
The DONES Facility

The fusion relevant neutron source and that will allow to fulfill the objectives of the Program.



+ many other additional validation activities in many different aspects

Main conclusion up to now: design seems feasible



LIPAc construction for phase B+ completed in March 2020



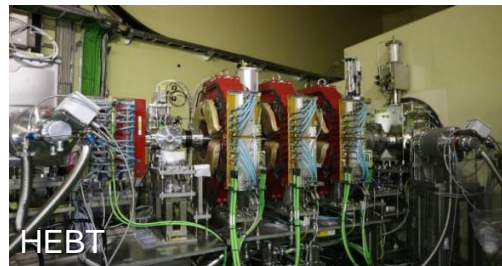
Injector



MEBT



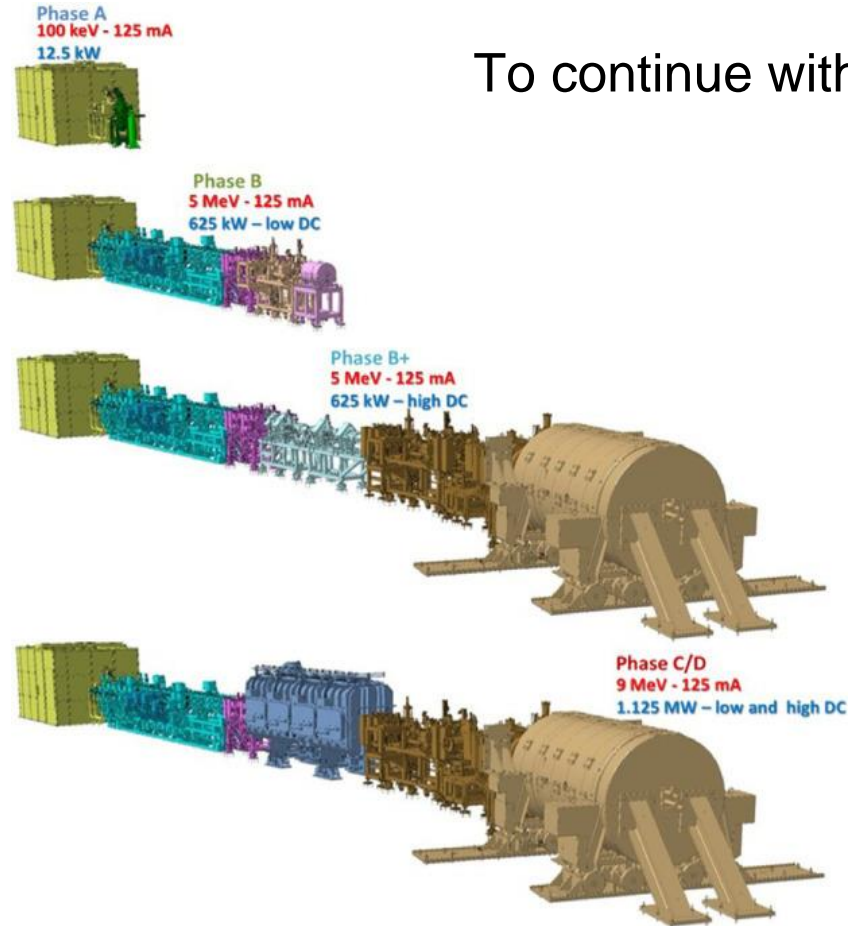
RFQ



HEBT

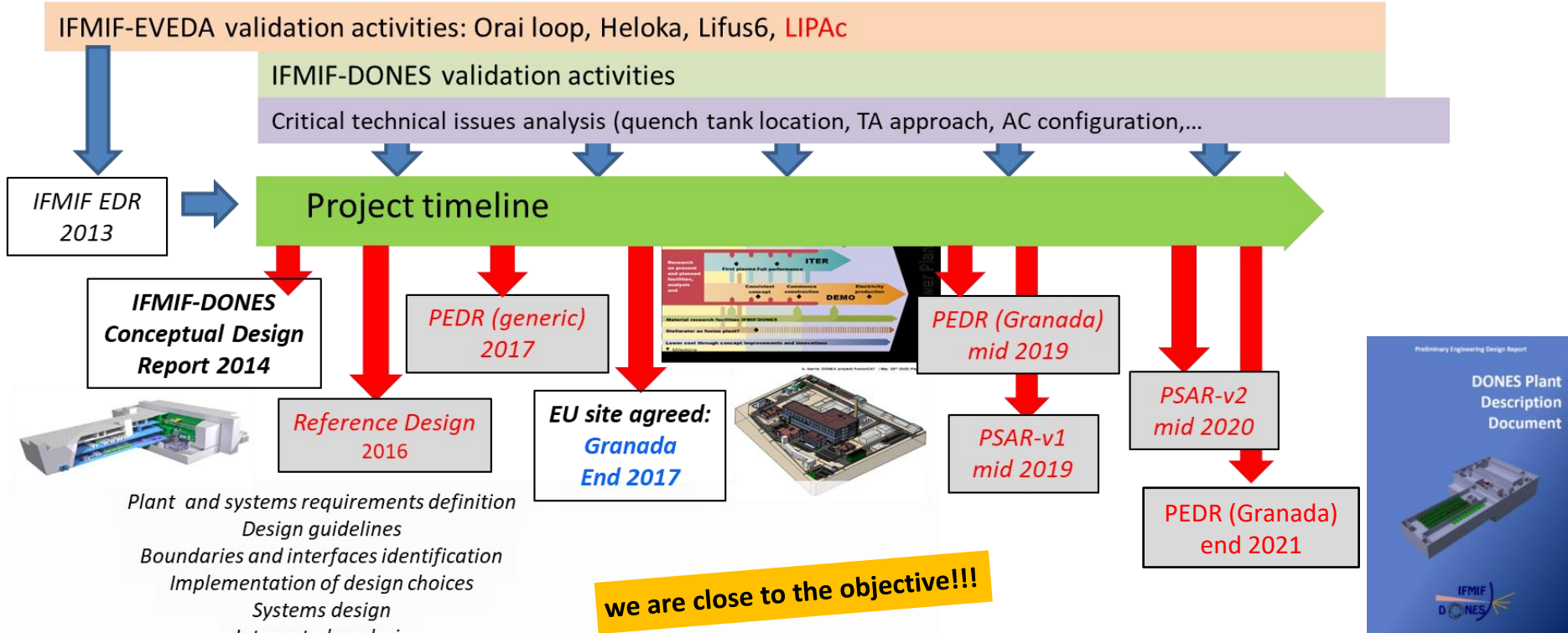
World record achieved!!!: 125 mA of D+ up to 5 MeV

To continue with the LIPAc accelerator operation:



- In the next two years it is expected that the Accelerator technology will be fully validated (operation up to full energy, full current)
- To become a test bench to optimize the DONES operation
- Training facility

Main objective: To be ready, from the technical point of view, to start the DONES construction phase by the early 20's



To continue with the IFMIF-DONES design activities:

- Draft specifications for the main building and conventional plant systems contracts ready in 1-2 years
- To develop some key-component prototypes
- To support the (future) Project Team with long-term transversal activities (safety, availability, maintenance, neutronics,...)
- To prepare the operation phase



Main objective: to support the proposal to built the facility as soon as possible and to assure a fast start of the project.



Technical objectives:

- Full detailed characterization of the site (geotechnical, seismic, radiological, meteorological,...)
- Construction of some buildings.
- Initial steps for a Project Office (around 10-12 people now available).
- Specific training program (around 20 additional people).
- Construction of some specific prototypes and medium size facilities.

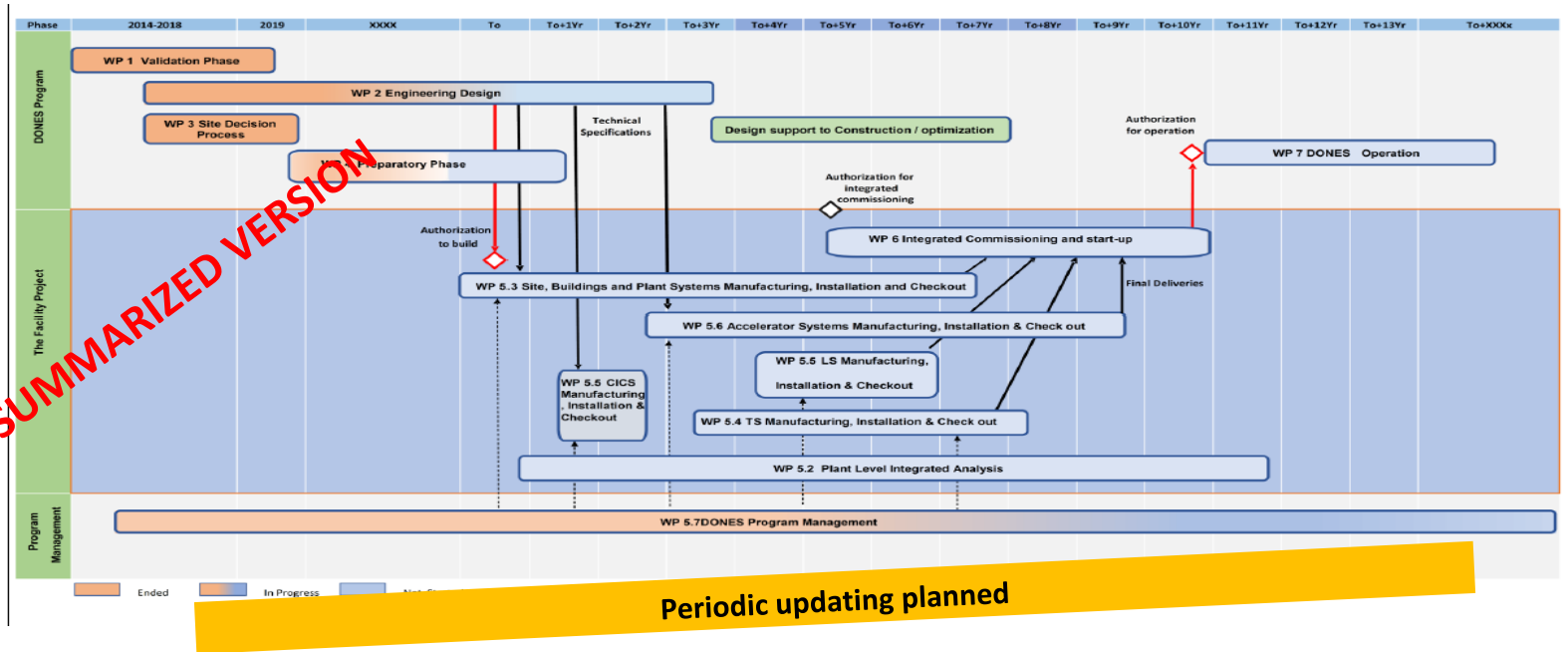
Main objective: To prepare a draft agreement on the international implementation of the DONES Facility project

Several work packages were defined:

- Propose a legal, governance and management framework for the Project
→ A model similar to the Broader Approach one has been agreed
- Propose a financial framework for the Project
→ A full set of project-related documents prepared with several updates
- Prepare the required specific Licensing and Permitting
→ Contacts with Spanish Regulatory Body already running
- Prepare for the use of Structural Funds
→ Preliminary draft proposal prepared
- Evaluate possible technical alternatives of strategic interest
→ A special effort to promote non-fusion users was made and technical recommendations have been made

Completed December 2021

- The Schedule describes a sequencing and definition of DONES Construction and commissioning (a few thousands activities identified)
- Developed taking into account recommendations of big-projects experts and taking into LIPAc schedule, DONES commissioning scenarios, licensing aspects,....:



- | | Critical path milestones |
|---|---------------------------------|
| • Project “start” | T0 |
| • Initial team build up | +1 y |
| • Site preparation contract | +1 y |
| • Buildings and Plant Systems contract | +2 y |
| • Building ready | +6 y |
| • Injector contract | +4 y |
| • Injector installation | +6 y |
| • RFQ contract | +4 y |
| • RFQ installation and commissioning | +7 y |
| • SRF linac contract | +5 y |
| • Start of SRF installation and commissioning | +8 y |
| • DONES (integrated) commissioning | +10 y |
| • Start of DONES operation | +11 y |

Identification of the critical path is very important because it guides the design effort

← Hold point linked to LIPAc results

+1-2 years of irradiation and +1-2 years of PIE
First materials data around T0+(13-15)y

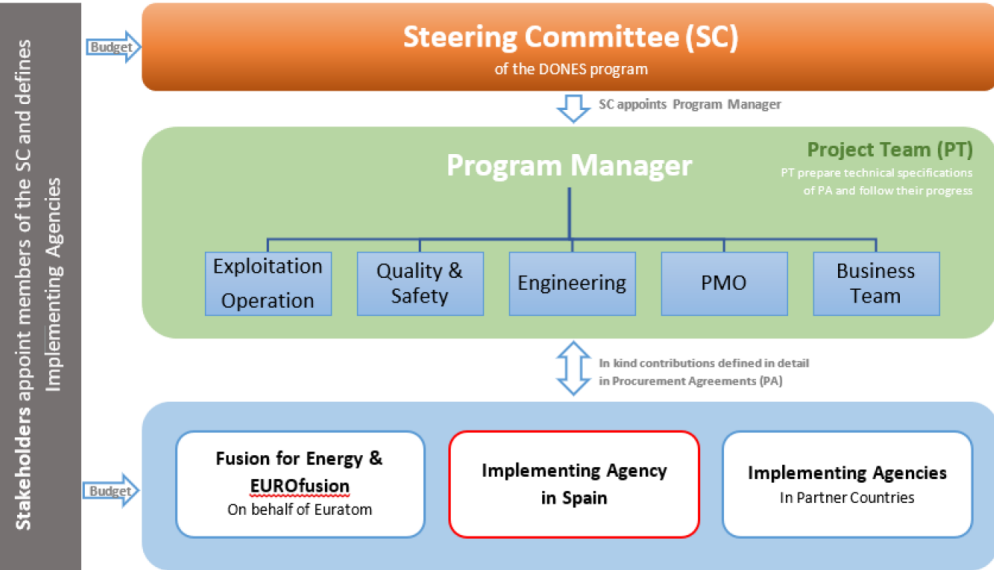
Aim is the DONES Program (not just the DONES Facility)

Partners contributions would be:

- In-kind components, and/or
- People to the Project Team, and/or
- Cash for Common Expenses and Reserve Fund

Contributions will be agreed in a qualitative way by the stakeholders and in detail by Procurement Arrangements between Implementing Agencies

- Project run by very flexible Project Team built up on **In-Kind Contributions from different partners**
- Design Authority in the Project Team
- Owner/Operator responsibility on the Spanish Legal Entity



Model similar to the one used in the Broader Approach project

Proposed a fast implementing scheme that will allow fast start of the Project, based on:

- **“political”** commitment at the Minister level by bilateral agreements, and
- **“formal”** commitment at the Implementing Agency level

Also proposed that the DONES-SC can be established as soon as in-kind commitments for around 75% of the DONES Facility construction needs are available

Present financial overview

- **Spanish commitment:** 50% construction costs (main planned contributions: people to the PT, Buildings and Plant Systems) and 10% operation costs
- **Croatian commitment:** 5% construction costs
- **F4E** (around 20% construction costs -130 M€- **included in the presently planned long-term budget**)
- **Japan** formally invited to discuss about their possible involvement in the Program as well as other possible partners that showed some interest (Italy, Poland, Sweden, Germany, Portugal, France, Belgium, ...)



Target: To establish the DONES-Steering Committee (late 2022-beginning 2023?)

(and that means the “official” start of the DONES construction Phase)

