

March 21st 2022

UPDATE ESS

Executive Advisory Board

- New Director General Helmut Schober is onboard since November, with a sharp focus on ensuring ESS is operational by end 2027 – 15 working instruments and a neutron beam at 2 MW.
- The revised post-covid baseline provides a powerful new platform for this delivery.
- The challenges now are mainly implementation of the new baseline plan, including catching up with pandemic induced delays, reinforcing the work-model for the in-kind deliveries of technology, and optimizing the organization for executing the new plan
- An agreement has been made at the Council level on how to cover the funding gap of € 550 million, to delivery of the science ready facility. This agreement now needs to be discussed and agreed on national levels, i.e. the 13 partnering European national governments, with principal commitments made during June 2022.
- War in Ukraine and sanctions on Russia have no known major short-term effects. Long-term impacts are uncertain, as supply and costs of energy and materials might affect suppliers.

PROJECT PROGRESS

The civil construction is complete and has been handed over to ESS, according to plan. The focus is now, after the delays and cost increases caused by the pandemic and some technical issues, to fully advance technical construction of the Accelerator, Target and the instruments according to the new post-pandemic baseline.

The extensive rebaseline process, which is just completed, provides a new and totally revised plan, structuring the delivery of many thousand components. It includes a recalculated time frame and recalibrated budget, including realistic contingencies for both. With the confidence of ESS Council behind it, and total focus from ESS management, the attention of all parties is on making this new plan a success: operationally, technically and funding wise.

The overarching goal for ESS in 2022 is:

Implementing successfully the execution of the project according to the new baseline.

The timeline forward, according to the new revised baseline is clear and sharp. It states operational ability by end 2027.

This means:

- 15 instruments ready for operation
- A proton beam generating 2 MW.

Until that point, there are some clear milestones, such as Beam-on-target and First Science, these will be communicated and celebrated as they are reached.

MAJOR CHALLENGES RIGHT NOW?

The overriding challenge and task are ensuring the implementation, according to the new baseline.

A major challenge moving forward is coordination of the in-kind partners and their deliveries, to ensure the adherence of all parties to the new plan.

In-kind contributions consist of both service, labour, equipment and components. Often these contributions are constructed in several countries by a multitude of partners and delivered in parts to ESS, at different points in time, for installation.

In-kind partners are not subcontractors in a traditional hierarchical sense, they are partners of the project, delivering as part of the financing from member states, and can only be influenced by peer-pressure. At its best this creates tremendous buy-in from all membership countries, as all get to benefit through capacity-building and technology development.

Most in-kind deliveries are working well, but some problems are remnant from the pandemic and technical challenges still exist and will appear throughout the complex construction project. Solely relying on peer pressure can also cause a reduced focus on delivery from the in-kind partners. To avoid this ESS has established a new way to manage this process more efficiently, involving the in-kind partners more deeply in the planning, with frequent follow ups, reviews and assistance.

Internally ESS has set up an enforced in-kind project group, to follow through with delivery, quality etc. The main agent is the ESS management itself, which is taking the lead. The in-kind review committee (IKRC) answers directly to the Council and has been given a strengthened role moving forward.

There are also technical challenges. As the most powerful ever source of neutron beams is being created, new technologies need to be developed. One such example is the detectors needed to cope with scattered neutrons. With the new increase in both the flux of neutrons and the brightness, better detectors need to be developed. This needs to coincide with the increasing cost for the material of detectors. To manage the new demands, a new type of detector type has been developed by ESS in Linköping, by using Boron-10 in the detector films, rather than the conventional industry standard Helium-3.

ESS is entering an accelerated phase of intense installation and commissioning work. ESS staff needs to manage new demands in close collaboration with incoming in-kind staff. Three instruments are being installed right now and, as this is a highly innovative and ground-breaking facility, more technical challenges are to be expected as the instruments are coming together, being assembled, installed and commissioned.

To an extent the technical challenges have historically been caused by a science community mentality to always strive for excellence. This can result in continuous improvements and create delays, a well-known challenge for most Big Science facilities and closely monitored and mitigated.

At the same time, with organizational and technical challenges being dealt with, there is a strong focus on efficiency and cost-savings, with Council pointing out that the new budget must be kept strictly. An unknown factor in this work is the cost development of raw material, energy, components to a large degree driven by the war in Ukraine.

AT THE TOP OF THE AGENDA

The new Director General Helmut Schober started in November of 2021. He stepped in right after the extensive rebaseline process had been finalised. His main task has been to make ESS happen in accordance with the new baseline.

Focus has been on identifying what works well, and where things have been sliding. And then create a stronger team with the culture needed to deliver on time, on budget and with the right quality, meeting the 2027 project delivery. One such cultural shift has been on establishing a higher level of schedule management and cost control. Director General Schober is also working on sharpening the management, and a more focussed top management team. The strategy directorate has been dissolved and strategic issues moved back to the Director General. A general overview of the organisation in order to establish increased productivity and improved performance is ongoing with focus strengthening responsibility, accountability and delivery, while supporting each other towards the end goal.

THE FUNDING GAP.

How much additional funds are needed, and what is the plan forward?

Some 550 million euro are needed to cover operations costs for the two-year construction project extension, until the construction phase ends in 2027 and some other cost increases.

The plan forward has been set in the rebaseline process. This plan has been reviewed by 28 external experts, providing advice on the technical, operational and financial feasibility of the plan. The logic and viability have been anchored in the Council, to build trust in the metrics.

Who will pay for the gap?

Council has agreed on a preliminary model for the distribution of the needed funds among the Member states. This model takes into account an initial ramping down of the high funding level of the host states in the construction (49%) towards considerably lower intended share of the steady state operations costs (15%) and the corresponding increase of other member countries share.

Over the next months each member state's national governments funding body (Departments of Education, Research or similar bodies) is working to ensure contributions following that preliminary agreement.

What is Sweden's position?

Sweden is the key host country, this leading role brings expectations from other countries, and Sweden needs to be seen to be in the driving seat. Sweden's new minister of research is showing a good understanding of ESS role, which is positive and supporting outreach to other membership states. Also, a stronger ownership is being undertaken by Vetenskapsrådet.

What is the time plan?

Principal agreements need to be reached before summer holidays 2022, with the final signings before the end 2022.

Even if firm new commitments are successfully completed there may be some cash-flow issues for the nearest years since a few countries have restrictions in when they can pay. To mitigate this, ESS will use the signed agreements as collateral in order to secure bridge financing from European Investment Bank, Nordic Bank and Svensk Exportkredit.

WAR IN UKRAINE IMPACTS AND RISKS

The short-term risk exposure is low. Historically there has been some internal work done by sub-contractors' depending on Russian components etc. There is none at the moment and no new will be started as European research collaborations with Russian and Belarusian organisations are suspended until further notice.

However medium-long term, problems might arise for in-kind partners, or their subcontractors, as materials, energy etc become more expensive or even hard to procure.

The pressure on ESS member countries might possibly affect the ability to follow through with certain funding.

ENERGY PRICES UNPREDICTABLE DUE TO THE SANCTIONS ON RUSSIA

During the construction phase, the cost and supplies of energy are not major issues. However, when up and running the energy costs of ESS are estimated to some 10% of the total operating budget and the increases in global energy prices add to a pre-existing Swedish energy challenge. ESS is continuously reviewing future energy costs.

At the same time ESS will be selling excess thermal energy, generated mainly when cooling both target and accelerator, to the district heating system, which creates income and contributes to the sustainability goals established for ESS.

In addition, ESS is investigating future solutions for independence from the local net. This will anyway be a long-term solution and not be ready until after 2030.

INCREASED ENGAGEMENT ON THE SWEDISH ARENA

Although main focus right now is on realising the new plan and new budget, there has been increased engagement in anchoring ESS in the Swedish community. As you are all aware increased awareness is of high importance:

- EAB and the upcoming Innovation Day is a key component in building support and anchoring ESS in Swedish industry.
- ESS involved in a working group led by Vetenskapsrådet and the Advisory group for the ESS and MAXIV Office to develop and modernize access modes for ESS towards both academic and industrial users.
- ESS is involved in collaborations with SciLife lab and MAX IV for increased use by the life science industry. In this project both LIF and Swedenbio are partners.
- ESS is involved in the Science Park function, decided by the Government and assigned to Vinnova. The goal is to create a national ecosystem that makes full value of the investments of ESS and MAX IV.
- There are several smaller initiatives to engage Swedish industry in using ESS in the future and also to create academic-industrial platforms to make it happen.
- Vetenskapsrådet has also funded two instrument projects under Swedish flag, that we have talked about earlier and in that work, ESS is involved.

This is to mention a few strategic involvements to anchor ESS among Swedish stakeholders and the Swedish community and may be valuable for you when discussing the project in your networks.