Exploring the socio-economic impact of ESS

2013 – 2018

Org.nr. 768200-0018
European Spallation Source ERIC

ESS' Socio-Economic Impact

Europe's Research Infrastructures (RIs) play a crucial role in the delivery of scientific breakthroughs and the fostering of innovation through enabling science. Given the broad consensus on the need to address the societal challenges facing Europe and the world, science has an important mission to create and sustain societal impact.

The European Spallation Source (ESS) ERIC is an international, multidisciplinary research facility based on the world's most powerful neutron source. The facility is under construction in Lund, Sweden, with its Data Management and Software Centre (DMSC) located in Copenhagen, Denmark. ESS is currently in the middle of the Construction Phase which is planned to run until 2025, with the Initial Operations Phase (2019-2025) running in parallel. The vision and missions of ESS indicate clearly that ESS is not only supposed to achieve scientific breakthroughs, but also to generate a much wider range of meaningful societal impacts. These impacts are expected to be evident directly to the Member Countries and to be extended indirectly to many countries and regions in the long term.

ESS has already been engaged in various activities and keen on demonstrating its Socio-Economic Impact (SEI). This brochure showcases the early evidences and some important aspects of SEI of ESS based on the narratives and impact pathways that are specifically relevant for the period of the Construction Phase up until 2018. This assessment was carried out by monitoring a mix of indicators about inputs, activities, and outputs.

In pursuit of ESS' strategic objectives, which are primarily about excellence in science, ESS has been and will continue to successfully create, sustain and accelerate its positive SEI on a broad range of stakeholders among and beyond its Member Countries to fulfil the essence of its vision of enabling science. This is to be achieved by persistent practices of awareness raising among stakeholders and policy makers, conscious decision making made by the ESS management, continuous monitoring of SEI indicators, and active collaboration with not only the scientific community but the society at large as well.

By the end of 2018, the 654 publications authored/co-authored by ESS have been cited 4671 times, increasing by 14.6% on average every year.

Between 2013–2018, 54% of 541 publications with ESS affiliation were co-authored with partner universities, 8% with at least one industrial firm, 64% with another research infrastructure.

ESS has worked with 194 new partners in grant projects, 16 of which are from outside the EU.

ESS has welcomed a total of 19,465 visitors to the construction site or off-site facilities. During 2013–2018, ESS was mentioned in a total of 11,293 online media articles.

VISIT

ESS has awarded 192 contracts valued above €50k, 92% of which to firms in its Member Countries.

According to the ESS Supplier Survey, 37% of 284 respondents reported experiencing increased overall profitability, and 20% having entered a new market.
Among the 208 non-off-the-shelf survey respondents, 50% reported improved technical know-how and many derived other innovation benefits.

According to the 27 respondents of the In-Kind Partner Survey, nearly three quarters of the In-Kind Contributions require either highly customised or new and advanced products, technologies, or services.

Publications

A strategic objective for ESS is to produce best-in-class research output in terms of both scientific quality and socio-economic impact.

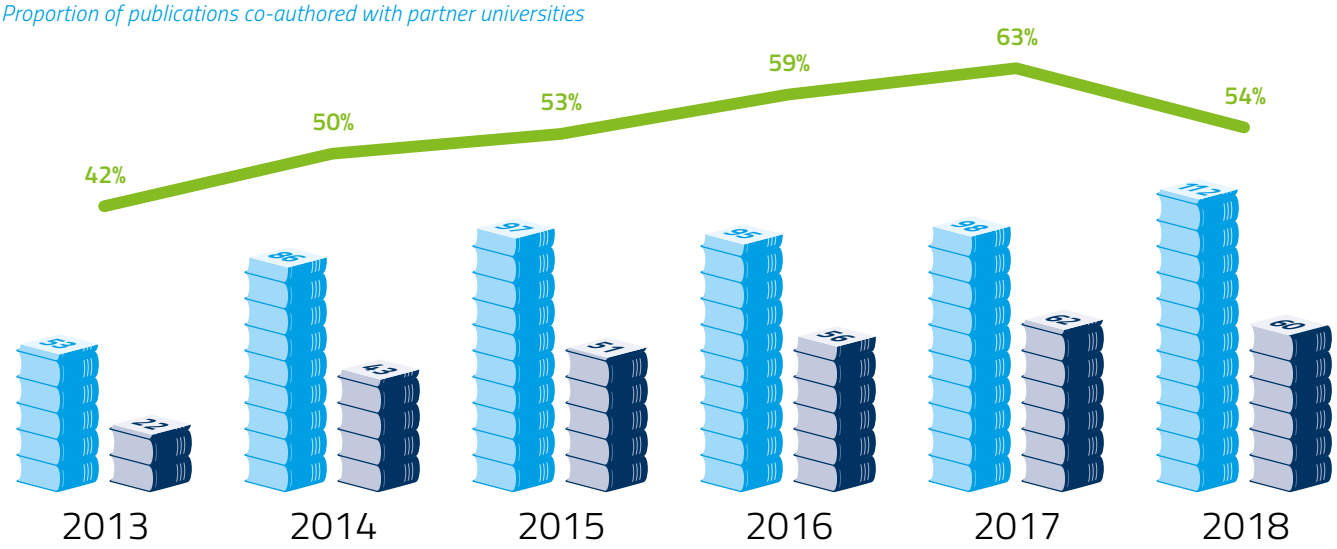
As a world-class scientific research infrastructure, ESS will be the centre of numerous research activities in relevant scientific fields for many years to come. The research outputs must be excellent in terms of scientific value, as well as creating impact to ESS research partners within the scientific community. The scientific community relies on publications for sharing accurate, up-to-date information about research being carried out all over the world. By the end of 2018, ESS had not only authored and co-authored hundreds of publications, but these had also been cited thousands of times.

With this, ESS can already demonstrate considerable research outputs that reflect both its ambition to be the best-in-class with regards to the technology development, along with the construction of ESS and its preparedness for the future scientific breakthroughs it is going to enable. Although it is not yet an operational facility, ESS has already become a leading member of the scientific community in many fields, demonstrated by ESS' scientific publications and collaborative research. This activation of the global scientific community represents the fact that ESS is already having a significant, positive impact, and that influence will continue to grow.

Publications co-authored with partner universities

Excellence in ESS scientific research has a notable effect on ESS partner universities who are strong collaborators on research activities with ESS. This is reflected by 54% of the total of 541 co-authored publications being published together with partner universities.

Proportion of publications co-authored with partner universities



Share of publications co-authored with partner universities

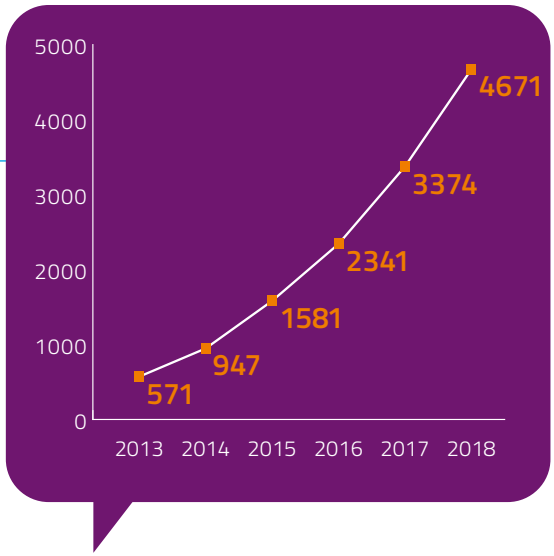
Number of publications with ESS affiliation (publications including ESS staff) per year

Number of publications co-authored with partner universities

ESS research outputs are best-in-class

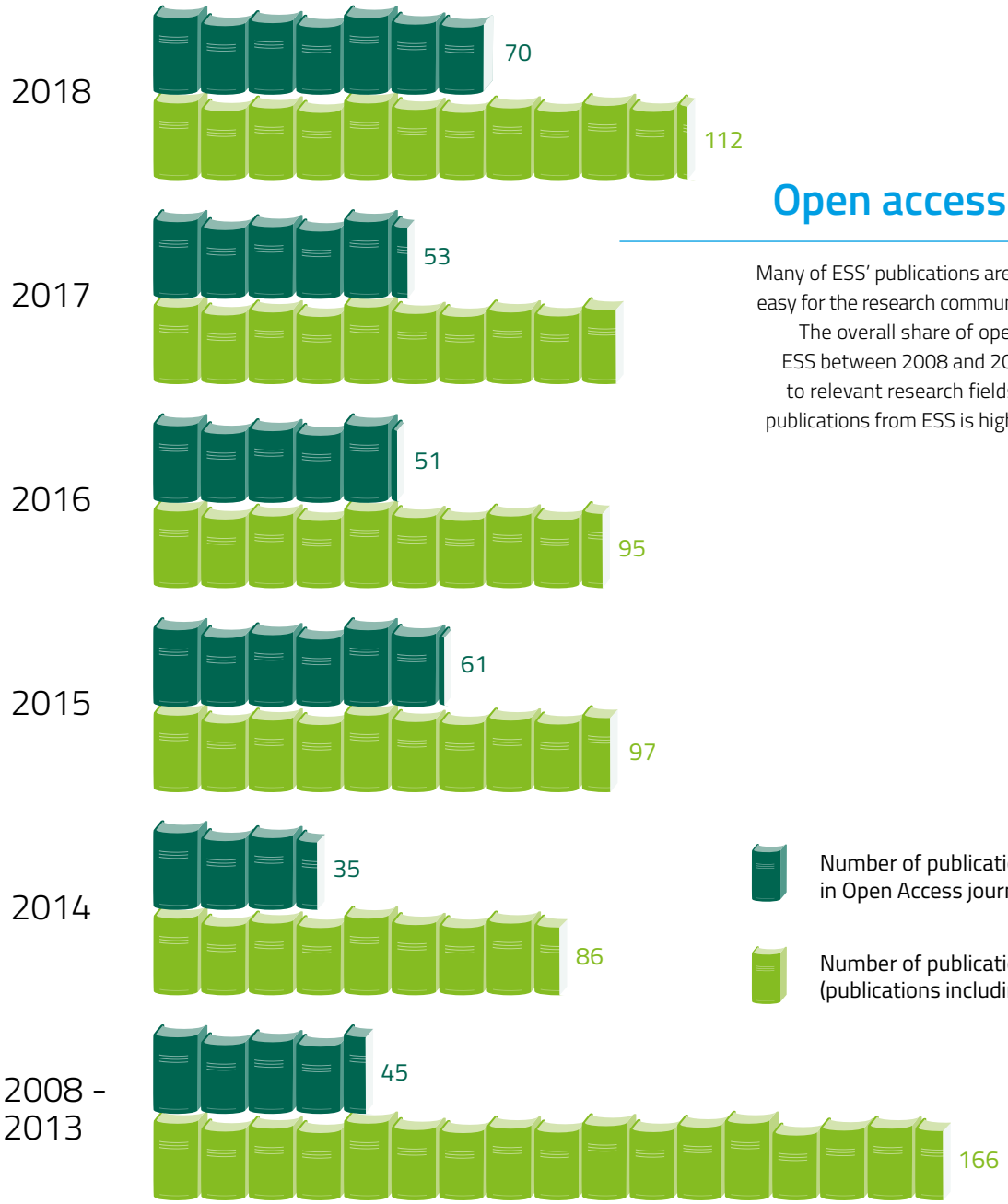
The number of citations to publications authored/co-authored by ESS since 2008 reached 4,671 by the end of 2018. With relation to the total number of publications, the rate of citations increases by an average of 14.6% every year. Whereas the ESS facility is not yet operational, a gradual rise can be expected in the years leading up to First Science and the User Programme respectively.

Total number of citations to publications of ESS



Open access publications

Many of ESS' publications are open access, making them easy for the research community to access and recognise. The overall share of open access publications from ESS between 2008 and 2018 is 42%. When compared to relevant research fields, the share of open access publications from ESS is higher than the global average.



Collaborations

ESS supports and develops its user community, fosters a scientific culture of excellence and acts as an international scientific hub.

Science is powered by collaboration, and ESS is dependent on the long-term sustainability of the existing community of European neutron scientists and facilities. For its scientific success, ESS must be directed by the scientific needs of its future users, and has already dedicated significant efforts to participating in a range of collaborations. This is shown by the ever-increasing numbers of new partners, including those from industry, involved in various relevant activities and grant projects.

To foster a scientific culture around neutron source research and related fields, it is also important to engage society through various public communication, scientific events and outreach activities, and every year ESS welcomes thousands of visitors. This demonstrates the high level of interest in ESS as a facility and helps ESS to achieve ambition of being an open, welcoming presence in the scientific community.

Visitors

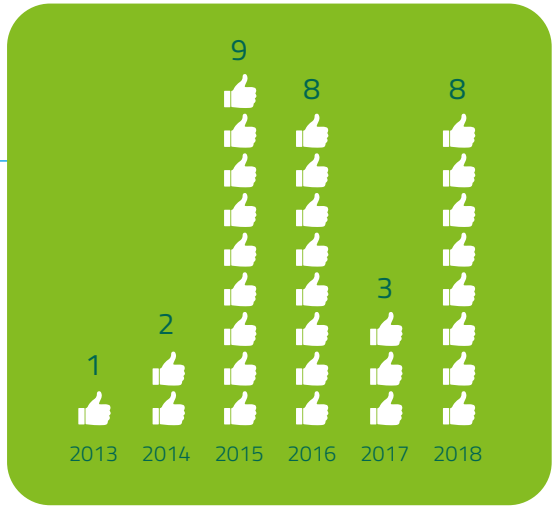
From when ESS opened to visitors to the end of 2018, the facility has welcomed a total of 19,465 people. Nearly 40% of these visitors came for informational purposes to learn more about ESS in general. These visitors include, for instance, local associations, schools, and student groups and many more.

Number of visitors to ESS and number of informational visitors to ESS

Granted proposals

ESS has worked successfully with grants, with an average of 33% of those applied for being granted, boosting the development of capabilities, competence and collaboration with other facilities and universities while delivering important work to the community.

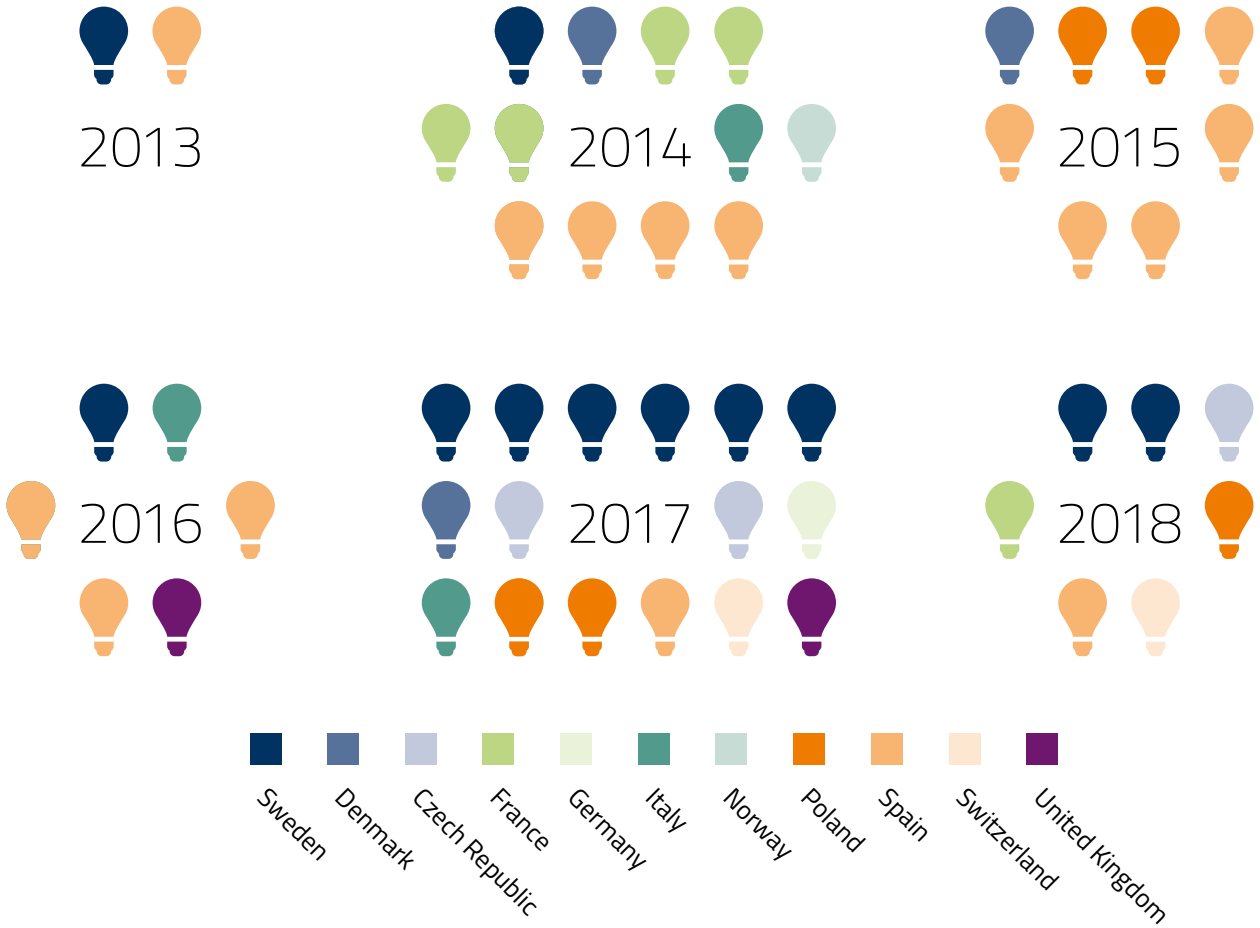
Number of grant proposals granted per year - by all funding agencies



R&D projects with Member Countries

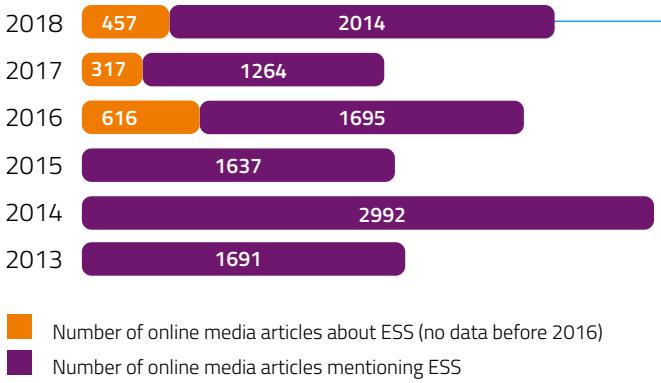
Cooperation with industry is important, and grant partner organisations include potential future users from industry. In addition to grants involving industrial partners, there are various R&D collaboration projects procured from industrial firms. The figure shows the number of those projects from each Member Country.

Number of R&D projects involving industry from Member Countries per year



Collaborations continued

Online media articles



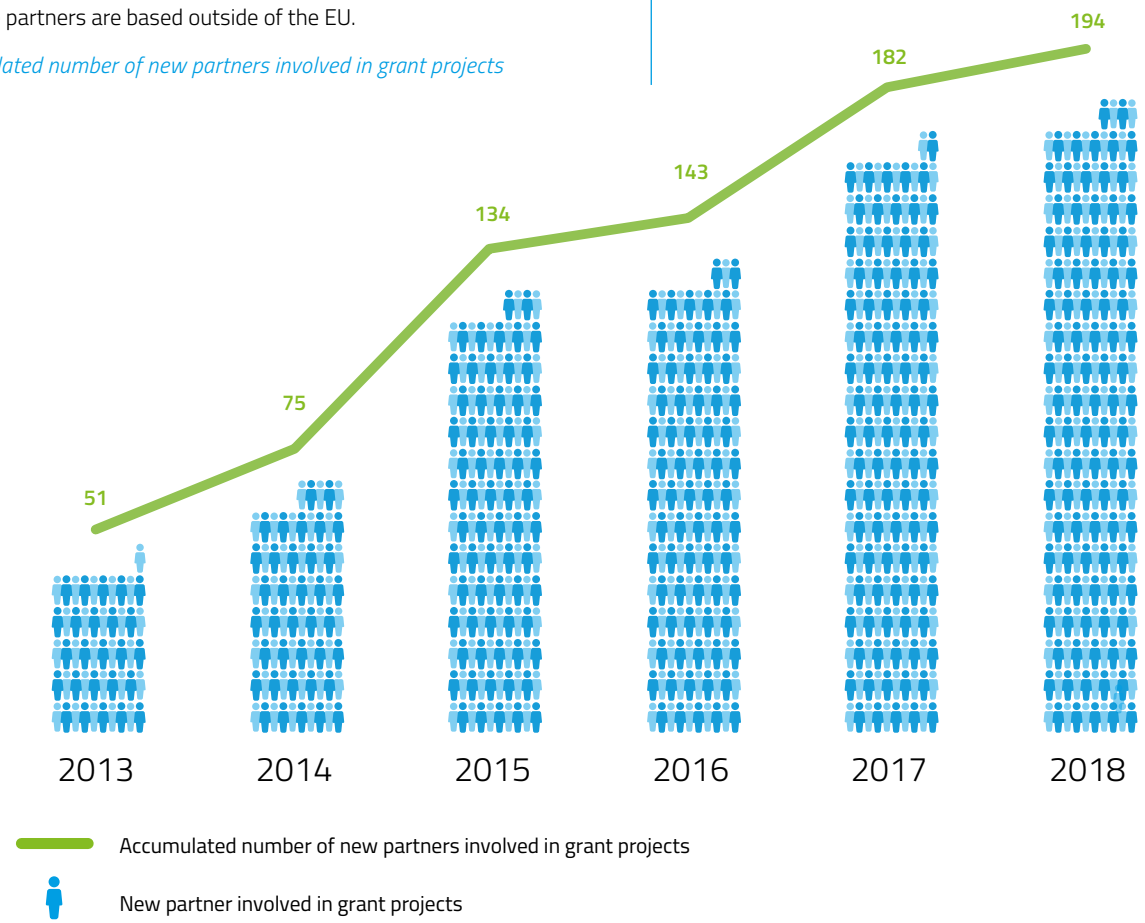
News about ESS has travelled far and wide through articles and a strong social media presence. During 2016-2018, 1,390 articles specifically about ESS were published online, with a potential reach of over 7 million readers, and during 2013-2018, ESS was mentioned in a total of 11,293 online media articles.

Number of online media articles about ESS and mentions

New partners

ESS has expanded its network through grant projects by collaborating with 194 organisations since its first grant collaboration in 2011. Sixteen of these partners are based outside of the EU.

Accumulated number of new partners involved in grant projects



Building ESS

Building ESS safely, on time and on budget, in a safe, efficient and economical way is a fundamental objective for ESS and responds to the requirements of its stakeholders, the Host Countries and Member Countries.

By achieving this, ESS contributes to the community and has a positive socio-economic impact before First Science. ESS is built with highest consideration of safety, efficiency and environmental impact. This includes increased energy and water efficiency, utilisation of more renewable resources, reduction of greenhouse gas emissions and waste and increased recycling. This is all done with efficient procurement activities and financial control.

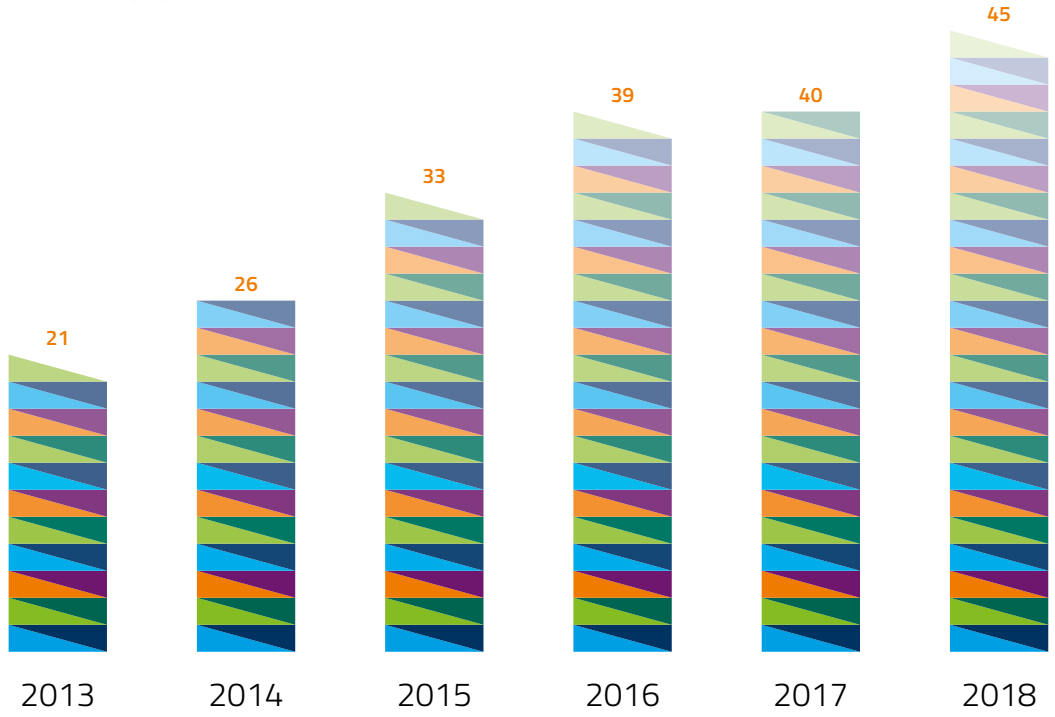
Member Countries are already seeing economic benefits both for industry and employment. The construction project relies heavily on In-Kind Contributions (IKC), and this model was chosen to share both the costs and the benefits of building and operating the world's most powerful neutron research infrastructure at an international level. The IKC model enables a distributed effort on constructing key deliverables across Europe, and facilitates the participation of highly skilled experts from all over the continent. This allows ESS to leverage the collective competence and resources of Europe's research institutions and industry, while supporting job creation, strengthening high-tech industry, and fostering collaboration between scientific stakeholders. This is all essential in order to build and operate ESS successfully.

Supporting a wide range of stakeholders in Member Countries also requires diversified staff, and staff diversity and secondments are being tracked.

Diversity

ESS is being built by hundreds of international teams with experts at every level across the organisation. At the end of 2018, ESS had employed staff from 45 nationalities. Over the period, 214 new hires had relocated to Sweden.

Number of nationalities employed at ESS

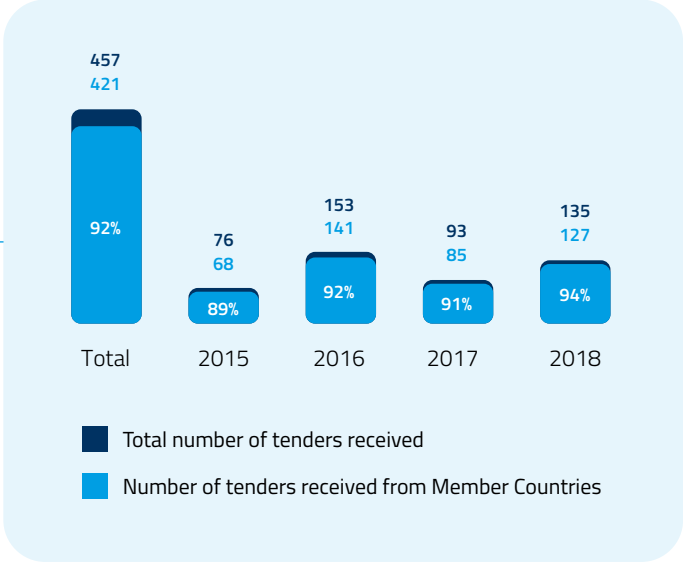


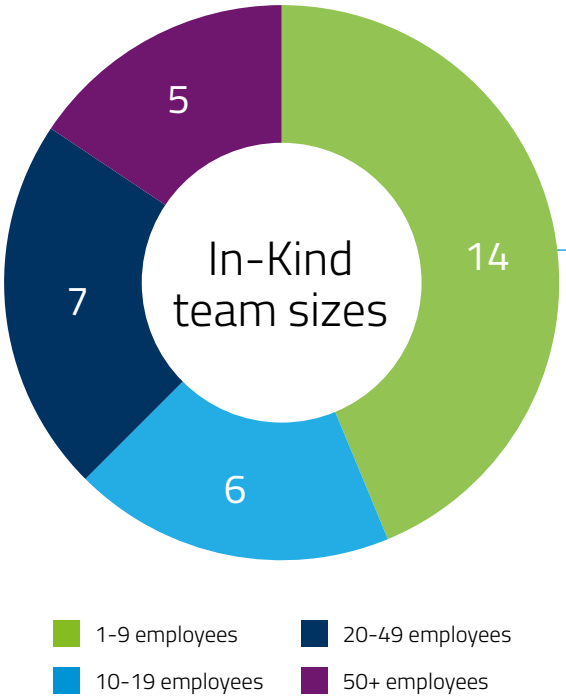
Building ESS continued

Share of tenders

The construction of ESS is a collaborative effort involving all the Member Countries. Amongst a total of 457 tenders received during the period, 92% were submitted by firms in the Member Countries.

Share of tenders received from Member Countries





Team sizes

The impact of ESS on employment during the Construction Phase extends beyond ESS. One example is that the ESS In-Kind Partners have also had the opportunity to hire new talent to work on their respective In-Kind Contributions. The diagram shows the sizes of the teams working with each responding In-Kind Partner.

Number of In-Kind Partners with various team sizes working on the ESS In-Kind Contributions (Data based on 32 responses collected in the ESS In-Kind Partner Survey)

Share of contracts

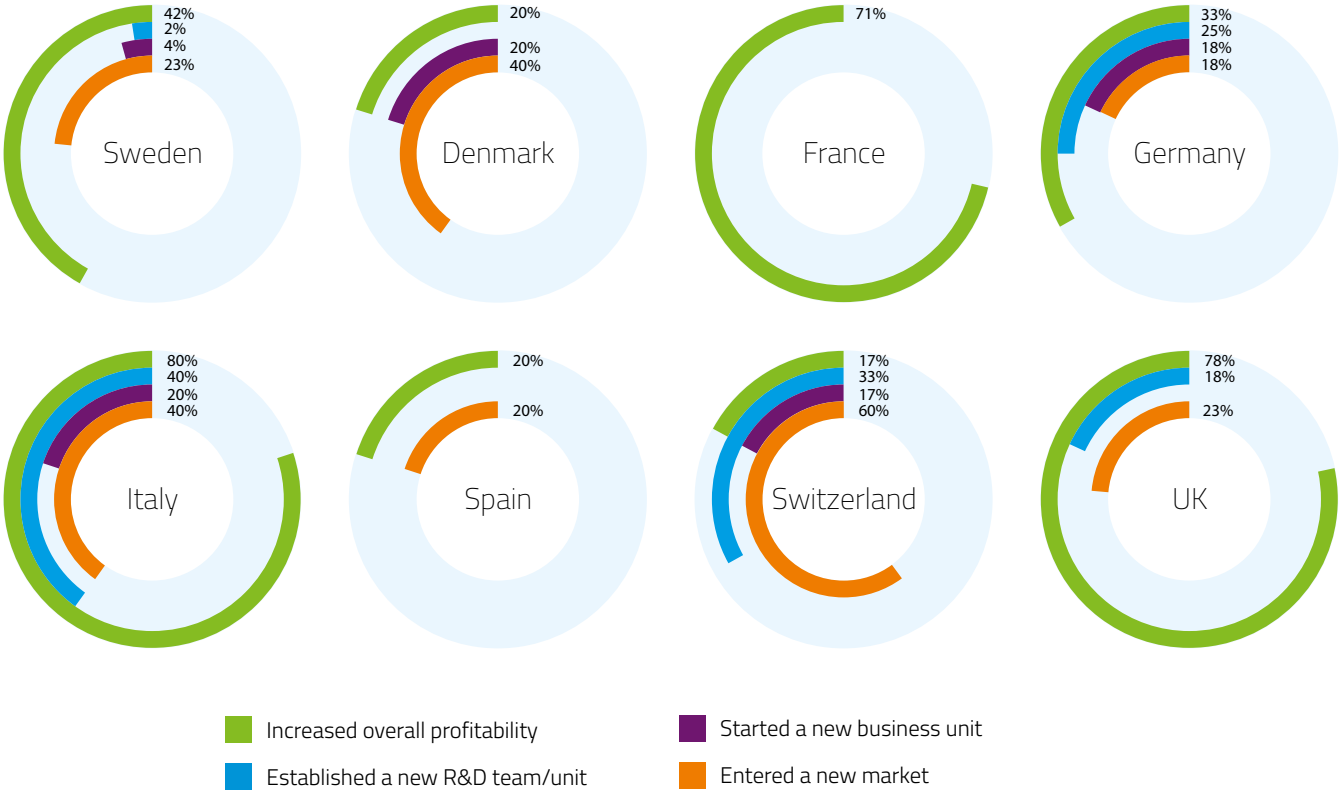
Among 192 tendered contracts awarded, 92% were awarded to firms in the Member Countries.

Share of contracts awarded to Member Countries

Economic benefits

Economic benefits enjoyed by ESS suppliers show different patterns, including increased profitability, establishing new R&D, starting new business units, and entering new markets.

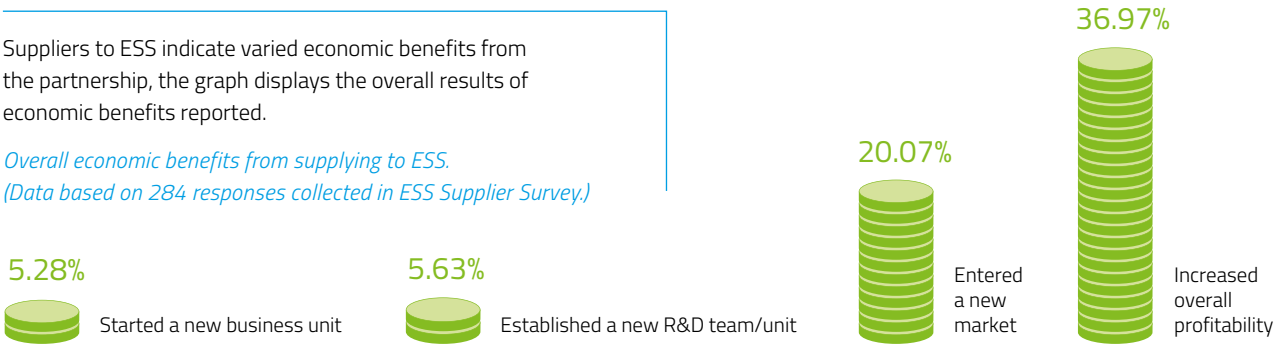
Economic benefit derived from supplying to ESS by responding Member Countries (Data based on responses collected in ESS Supplier Survey. Member Countries with less than 5 responses are excluded from the graphs.)



Overall economic benefits

Suppliers to ESS indicate varied economic benefits from the partnership, the graph displays the overall results of economic benefits reported.

Overall economic benefits from supplying to ESS. (Data based on 284 responses collected in ESS Supplier Survey.)



Partnerships

ESS has been charged with the strategic goals to develop innovative ways of working, new technologies, and upgrades to capabilities needed to remain at the cutting edge.

In pursuit of this strategic objective, ESS makes its impact by uplifting the capacity for technological innovation of itself and of In-Kind Partners and industry in the Member Countries. This is achieved by building and maintaining productive relationships across borders, where partners can provide anything from off-the-shelf products to new, advanced technologies.

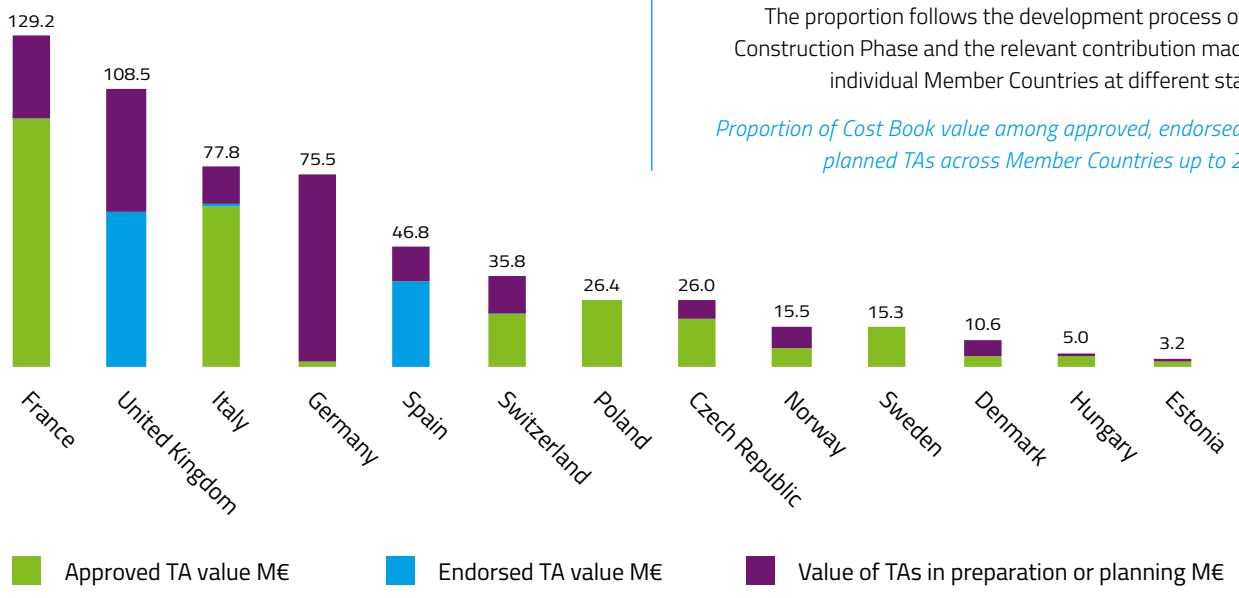
ESS has published procurement requests with a focus on the required result/outcome in a non-prescriptive way, allowing innovators and suppliers to present their solutions. Early supplier involvement is sought whenever possible to realise the full potential of suppliers' innovation strength.

The ESS IKC model creates the opportunity to enrich knowledge and skills and to create business in each Member Country, enabling them to benefit from membership already in the construction phase. The benefits are expected to exceed the direct relationship between ESS and its In-Kind Partners, through collaborative projects beyond the scope of the In-Kind Contributions, encouraging future users, and procured R&D. Similarly, by working with ESS, suppliers may benefit in terms of developing new technologies, products and services, and potentially extending market opportunities.

Proportion of Cost Book value

The In-Kind model is based on Technical Annexes (TA) with a connected Cost Book value. The diagram shows the proportion of approved value, endorsed value and value of Technical Annexes in preparation or planning up to 2018. The proportion follows the development process of the Construction Phase and the relevant contribution made by individual Member Countries at different stages.

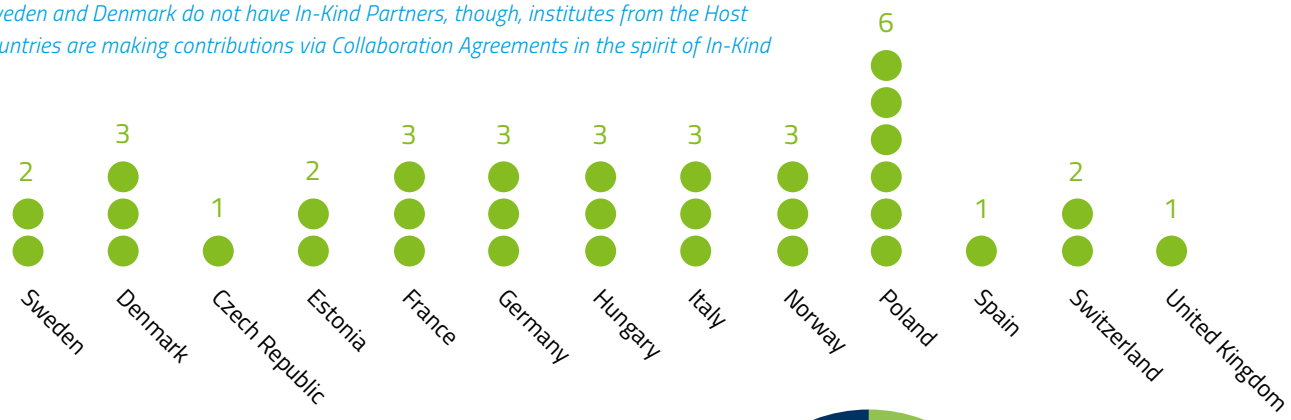
Proportion of Cost Book value among approved, endorsed and planned TAs across Member Countries up to 2018



In-Kind Partner institutes

A total of 33 In-Kind Partners (IKPs) have joined the ESS project throughout the 2013-2018 period. The first In-Kind Agreements were signed in 2015. Since then, by the end of 2018, the In-Kind Partners have signed a total of 22 In-Kind Agreements, with six In-Kind Agreements in preparation.

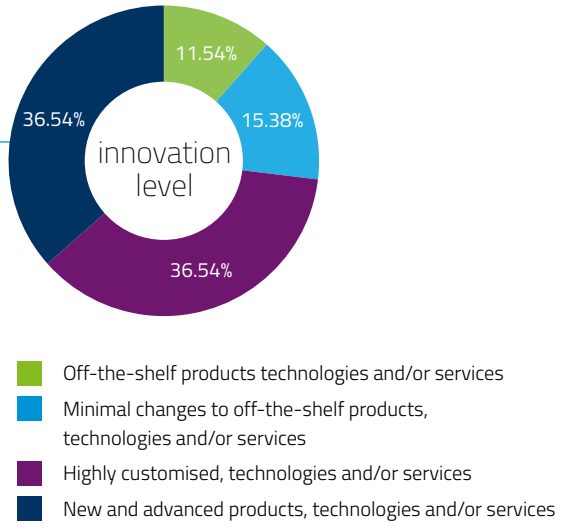
Sweden and Denmark do not have In-Kind Partners, though, institutes from the Host Countries are making contributions via Collaboration Agreements in the spirit of In-Kind



Innovation level

The In-Kind Partners have recognised high levels of innovation in their respective contributions. The diagram shows that nearly three quarters of their contributions require either highly customised technologies and/or services, or new and advanced products, technologies and/or services.

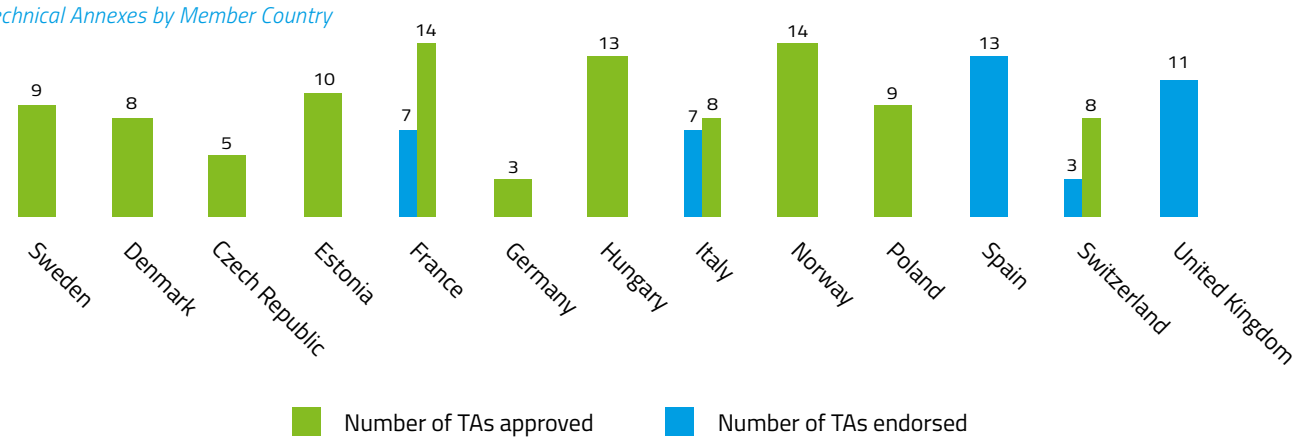
Innovation level of In-Kind Contributions (Data based on 27 responses collected in the ESS In-Kind Partner Survey.)



Technical Annexes

A total of 84 Technical Annexes have been approved by the end of 2018. A further 41 Technical Annexes have been endorsed, with the approval pending signature of the associated In-Kind Agreement.

Technical Annexes by Member Country



Partnerships continued

Innovation level

Most of the supplied products and services were relatively innovative as highly customised (reported by 53% of responding firms for both the first and the most recent supply) or new and advanced (reported by 36% and 41% of responding firms, for the first and the most recent supply, respectively) products and services, which required collaborative design and development with ESS.

Innovation level of products and services supplied to ESS. (Data based on responses from suppliers with high value contracts participating in the ESS Supplier Survey.)

Types of products and services

The figure shows the distribution of various types of supplies to ESS from suppliers that had high value contracts (above 50K€) with ESS. It is divided into first contract with ESS and most recent contract for comparison. It is obvious that products (goods) make up the majority from these suppliers, followed by procured consultancy and services.

Types of products and services supplied to ESS. (Data based on responses from suppliers with high value contracts participating in the ESS Supplier Survey.)

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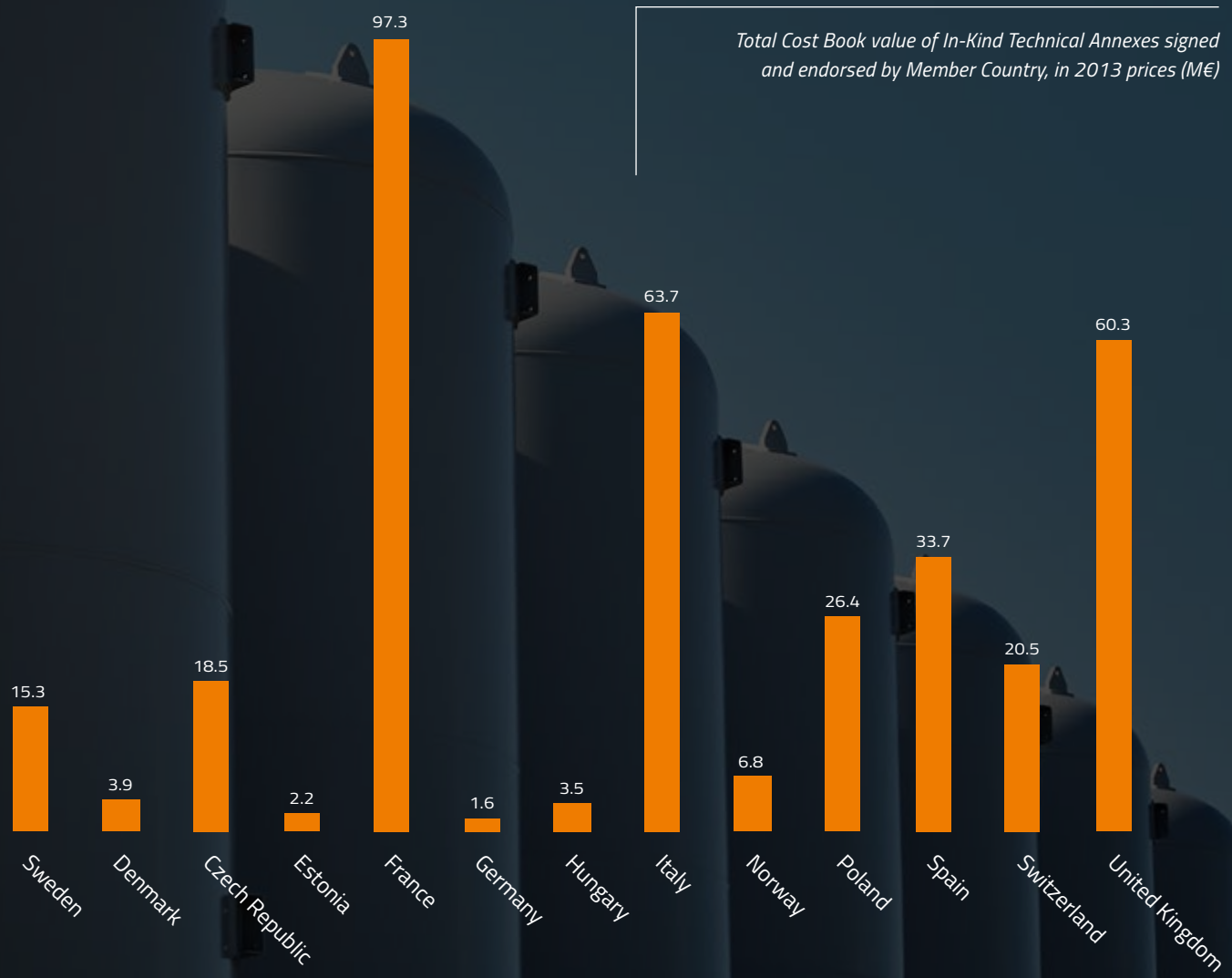
DTU

brightness²

BrightnESS² is funded by the European Union Framework Programme for Research and Innovation Horizon 2020, under grant agreement 823867

Total Cost Book value

Total Cost Book value of In-Kind Technical Annexes signed and endorsed by Member Country, in 2013 prices (M€)



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