4.5.1. Case study N°7: Tekniker

Since technical parameters of ITER's procurement procedure is complex (or not defined in advance) as is its unprecedented nature, F4E in collaboration with Tekniker[24] successfully defined technical prescriptions for a non-existent metrology tool which was specifically developed for ITER. Within 18 months, the Spanish company was able to invent the high accuracy tool which is capable of measuring with a tolerance of 20-micron, or a measure25 times thinner than A4 paper.

Through this project, Tekniker improved its skills and knowledge in the development of high-precision mechatronic systems as well as the ability to customize solutions. Currently, the company applies its expertise in metrology solutions for ultra-precise measurements to non-nuclear energy projects such as particle accelerators, neutron sources, robots and telescopes used in aerospace industry. Tekniker will likely continue to push technological boundaries to make inspection tools faster and more accurate.

4.6. ITER paves the way for DEMO

ITER is the biggest scientific international initiation in the field of energy research, as it brings together seven partners which accounts for half of the world's population and 80% of global GDP[25]. It is both multinational and multi-disciplinary in technology.

Combined with technological constraints of clean and sustainable power generation through nuclear fusion, political challenges, such as delays in harnessing fusion power and cost overrun of the project, add a new level of complexity to the overall process.

While an amalgam of cultures, the intensity of the innovation, and collaborative efforts contribute to make ITER happen, DEMO will benefit from the use of both its construction and operation experience. Resolution of the technological, political and economic issues which exist for ITER will be achieved by DEMO. Though DEMO will be bigger in size than ITER, it will not be as costly.

Firstly, ITER's purpose is to deliver various experiments and research the possibilities to increase the Q[26] factor while DEMO aims to produce large amounts of electricity. In this regard, ITER has been designed in a way to study different plasma configurations making the device itself complex and complicated. As a research reactor, it will be equipped by a glut (and redundant) of safety sensors and I&C (diagnostic) devices to monitor and control reactions and un-postulated events.

Secondly, seven parties with more than 30 nations which are geographically located all around the World are obliged to contribute their expertise and components. Depending on their work share, some had to specially construct various facilities in which manufacturing of pioneering components takes place. Moreover, oversea freighting of these fragile components is both time consuming and expensive. Indeed, when examining contracts awarded by IO and F4E, the logistics sector and employing international experts (bringing them to France with families and sending back) accounts for a considerable amount of contracting value. Involving many oversea nations requires complex project management. In case of DEMO, only Europe will be involved in providing these components and most of aforementioned cost could be eliminated.

[24] a private not-for-profit technological centre specialised in advanced manufacturing, surface and product engineering. The Spanish company focuses on developing intelligent robotic applications able to interpret the environment through multimodal sensors.
[25]https://fusionforenergy.europa.eu/downloads/mediacorner/publications/Highlights/Highlights_2016_light.pdf
[26] Ratio of « power out » to « power in ».