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How to involve Dutch Industry in ITER & DEMO?

***Nuclear Fusion Energy symposium,
Eindhoven, October 30th, 2014***

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Scope and structure of this presentation

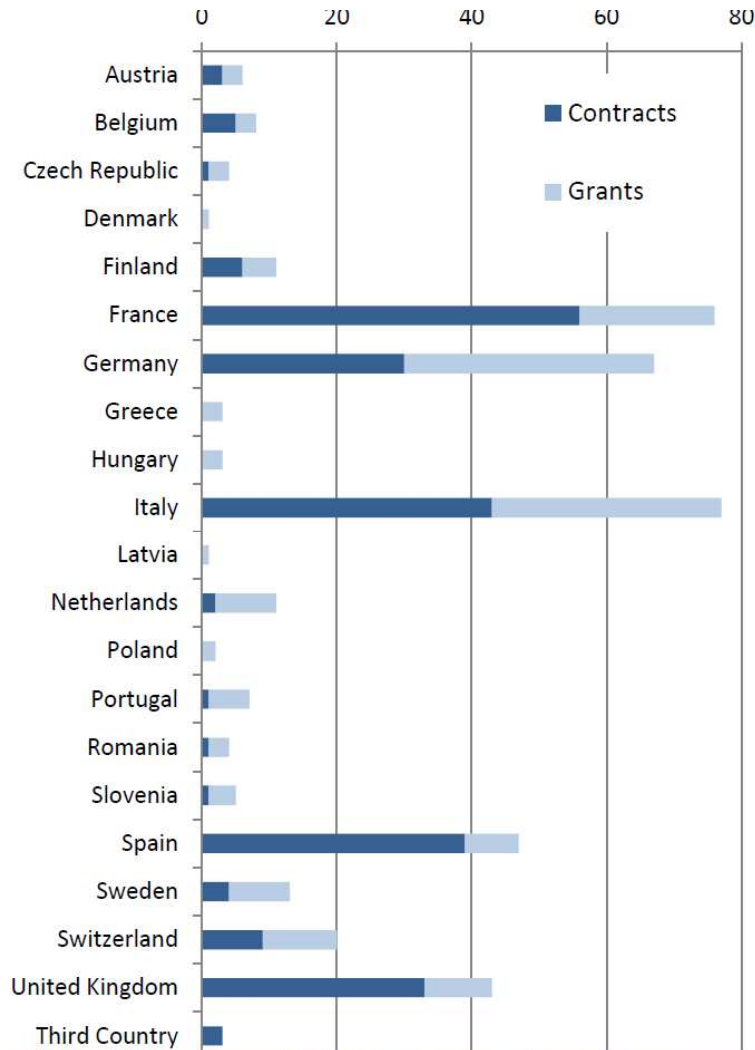
- From an industrial point of view, some of my observations made on very recent events are presented:
 - SOFT 2014 in San Sebastian (29 September - 3 October),
 - EUROfusion event in Brussels (9 October) and
 - Fusion Industry Innovation Forum - MB meeting in Barcelona with F4E (22 October)
- Looking back and forward
- Key question: “How do we ensure that we build up, with the public money, in a cost effective manner, the industrial capacity to realize ITER, DEMO and ultimately routinely electricity from fusion?” (F4E director Henrik Bindslev, EUROfusion event)

How it started; ITER-NL

- First outreach of ITER to NL industry in January 2004 (EFDA, EU, FOM present at Dutch Space premises)
- “FES-0” (3.65 M€, spring 2006) for pilots and extended proposal: ITER-NL was born!
- ITER-NL1 (15 M€, end of 2006): first formal FES-tranche running 2007-2009
 - For ITER-NL, 15 M€ was granted, to be divided between TNO-FOM-NRG-industry support as 30-30-10-30%
 - Specific Targets were Upper Port Viewer (UPV), Upper Port Launcher (UPL) and various NL industrial contributions
 - Goal was >60 M€ industrial return in NL and a solid scientific position
 - Industrial in-kind matching (25%) required
- ITER-NL2 (8 M€, fall 2009): second formal FES tranche running 2010-2014; this time focused on scientific activities on ECRH and (limited) diagnostics; no industrial part included



Distribution of # F4E contracts/grants in Europe



Where are we now? (2)

- **ITER has now passed the point of no return: larger elements have been procured to mainly big industry consortia, about 50% of the budget is still available for also smaller elements and services which may be offered by smaller industries**
 - Such as diagnostics, opto-mechanical and electro-mechanical equipments, including embedded software
- **Starting-up DEMO is now requiring attention, involving industry from the start (in contrast with ITER!)**
 - Focus on DEMO LLI's till 2020; academia with industry support
 - 2021-2030: DEMO design; industry gradually takes over the initiative
 - 2030: selection of preferred design for DEMO
 - 2031-2050: DEMO construction led by industry, leading to energy production from 2050 onwards

Where are we now? (3)

- **Special moment in time for fusion & stakeholders: ITER will be realized and widens opportunities for industry, DEMO is planned to follow and Wendelstein 7-X started commissioning**
 - nuclear industry (as important contributor) has top-level manpower available (also due to decreasing opportunities for fission)
- **Fusion based energy development is in transition: from an academic lead to effort led by industry with academic support**
- **Industry and science laboratories are however still different, complementary worlds which however should join forces**
 - It is a misunderstanding that industry is ready to invest in long-term development with the only perspective of potential spin-offs
 - Return on investment and risk mitigation are important triggers for industrial commitments, in particular in economically uncertain times

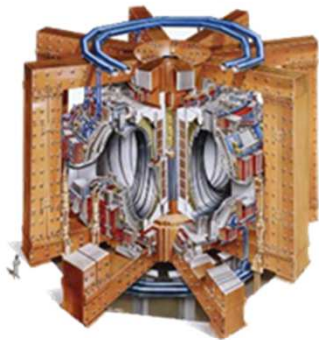


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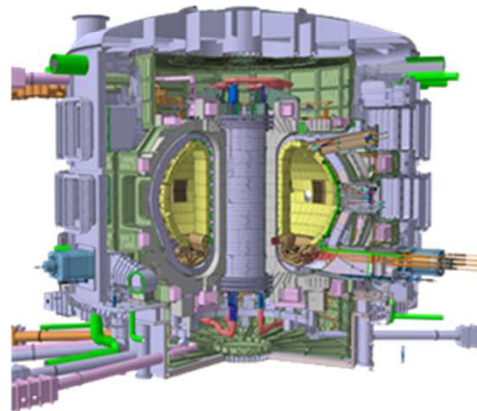
Roadmap to fusion-based power

From proof of concept to a prototype fusion-based electricity plant



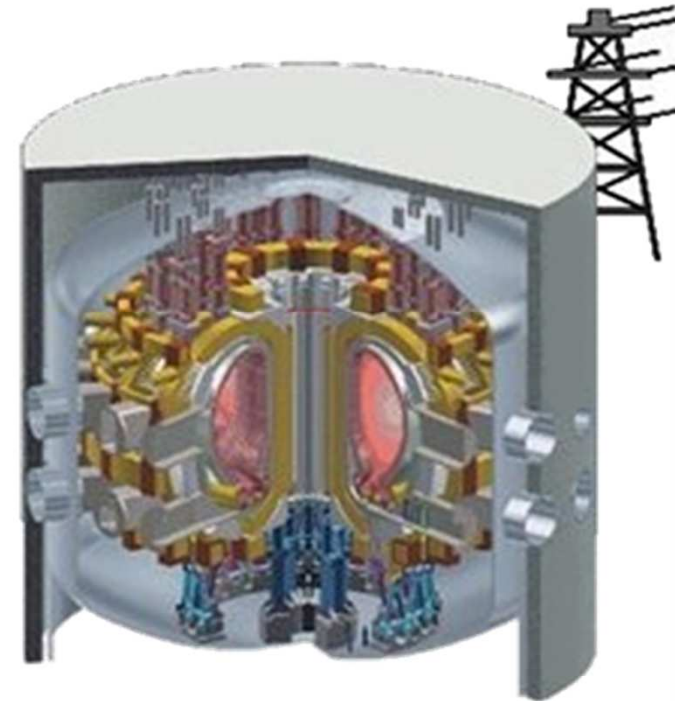
JET

80 m^3
 $\sim 16\text{ MW}_{th}$



ITER

800 m^3
 $\sim 500\text{ MW}_{th}$



DEMO

$\sim 1000 - 3500\text{ m}^3$
 $\sim 2000 - 4000\text{ MW}_{th}$

The way ahead? (2)

- **F4E now advocates a different approach to harvest from ITER investments and to build up the required industrial capacity and know-how:**
 - “F4E very strongly encourages research institutes to participate in the production of components in across boarder partnership with industries”
 - This fosters transfer of knowledge and innovation: “Connecting the best knowledge centers with the best industries is optimum for Europe”
 - “F4E will provide industry with a view of what procurements are coming up and who is already working on the designs”
 - Annual events to facilitate industrial preparations for forthcoming procurements will be set up: F4E forum, the first to be organized in Barcelona 10-12 June 2014
 - F4E staff (incl. working level), industries and public research organizations are expected to participate in order to exchange information and more importantly prepare for collaboration

The way ahead? (3)

- **Condition for exploiting this special moment in time for fusion based energy: join forces between stakeholders and remove barriers in order to realize ambitions**
 - Open and effective collaboration/partnership of funding agencies, industries, technological institutes, universities/fusion labs: all hands are needed on deck
 - This will also support much needed Technology Transfer, which is best realized in performing joint institutional-industrial projects
 - Mobilize adequate funding and political support for high ambitions of Fusion Roadmap
 - Arrange adequate payment of industrial contributions (potential spin-off is not a sufficient motivation for a long-term investment)
 - Explore new programmatic approaches, like PPP, reduction of financial development risks (e.g. by phased, cost-reimbursement contracts), ...



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Some conclusions

- Involvement of industry in ITER has been problematic in the past, in particular for the smaller industries in Northern countries
- The expected availability of smaller contracts and the pro-active attitude of F4E to involve (also smaller) industries triggers new opportunities
- DEMO will on the longer run be beneficial for industrial involvement
- F4E stimulates across boarder technology transfer between institutes and industry, which can improve conditions for industrial involvement considerably
- Maintaining the Fusion Roadmap planning (for ITER and DEMO) is crucial for conservation of momentum and credibility for fusion-based energy
- Close collaboration and partnership between funding agencies, industry, universities/fusion labs and GTIs, supported by politics, is needed to realize the challenging ambition of fusion-based energy by 2050

Remark: there is a strong Dutch representation on key-positions in the fusion world, which could work in the benefit of Dutch industrial involvement



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Addendum: ILO-Net & HHH

- **The ILO-Net has been established to bring together all Industrial Liaison Officers from Big Science institutes aiming at:**
 - providing Dutch companies access to orders from Big Science programs
 - offering industry bigger markets and continuity in high-value work by exploiting the similarity in approaches and technologies used in BSPs
 - improving access for science parties to highly qualified/innovative companies
 - facilitating SMEs with little international experience involvement in BSPs
- **In the ILO-Net, ILOs consolidate their strengths to bridge the gap between Dutch industry and large Big Science facilities.**
- **ILO-Net closely collaborates with Het Huygens Huys: ITER-NL like initiative to enable adequate industrial preparation for Big Science tenders**

www.bigscience.nl