El Séptimo Programa Marco de I+D de la Unión Europea
Cómo tener éxito en las convocatorias 2013

Activity: Research and Development

Title: Empresarios Agrupados: an innovative company Experience in the EU FPs

María Teresa Domínguez

Madrid, 12 September, 2012
INDEX

1. Company profile

2. Participation in R&D&I Programmes

3. Lessons Learned / Added value.
EMPRESARIOS AGRUPADOS

- An Architect-Engineering and Construction Management Company
- Created in 1971
- Main focus: Power Generation, Transmission and Distribution Projects
- Leading engineering organization in Spain.
- Project experience in more than 20 other countries
- Full range of engineering services provided to the electric power industry: from engineering studies to complete EPC turnkey projects.
- High-level innovation strategy. R&D involvement.
- Power Plant Projects
  - Nuclear
  - Combined Cycles
  - Fossil-Fired
  - Hydroelectric

- Support Services to Operating Power Plants
  - Engineering Support
  - Operation and Maintenance Support

- Electricity Transmission and Distribution Projects

- Services to the Electric Utility Companies

- Research and Development (R&D)
1. Company profile and references

2. Participation in R&D&I Programmes

3. Lessons Learned / Added value
2. Participation in R&D&I Programmes

- Generation III and III+ reactors
- European Union R&D programmes, Nuclear field
- European Union R&D programmes, Hydrogen generation
- European Large Scientific Installations
- Fusion Activities
- Participation in the EU Framework Program
### Generation III and III+ reactors

<table>
<thead>
<tr>
<th>PWR Westinghouse</th>
<th>BWR General Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP-1000  Advanced PWR, Passive type, 1000 MW</td>
<td>ESBWR Economic Simplified BWR, Passive type, 1550 MWe</td>
</tr>
<tr>
<td>AP-600  Advanced PWR, Passive type, 600 MW</td>
<td>ABWR Advanced BWR, Evolutionary type, 1350 MW</td>
</tr>
<tr>
<td>EPP  European Passive Plant</td>
<td>SBWR Simplified BWR, Passive type, 650 MWe</td>
</tr>
</tbody>
</table>

**Generation III and III+ reactors**

- **AP-1000 Westinghouse, PWR, Passive, 1100 MWe**
- **AP-600 Westinghouse, PWR, Passive, 600 MWe**
- **SBWR / ESBWR GEH, BWR, Passive, 550 / 1550 MWe**
- **ABWR GEH, BWR, Evolutionary, 1360 MWe**
- **AP-600 Westinghouse, PWR, Passive, 600 MWe**

**EU Programmes**

- EVITA
- ASTEC
- WAHALOADS
- THINCAT
- MICANET
European Union R&D programmes
Nuclear field

- Generation IV, Fast Reactors

**LEAD**
- LEADER
- ELSY
- SILER

**SODIUM**
- EISOFAR
- ESFR

**VHTR**
- ARCHER
- RAPHAEL

**GAS**
- GOFASTR
- GFR
European Union R&D programmes
Nuclear field

- Experimental fission reactors: JHR (Jules Horowitz Reactor)

- Transmutation
European Union R&D programmes
Hydrogen generation

INNOHYP
HYCycles
HYTECH
ADEL

Optimal coupling of sources and device for efficient hydrogen production by ITSE
European Union R&D Programmes
Large Scientific Installations

ESS – 1996

- 5 MW
- 1.3 GeV
Target stations:
- 4 MW, 50 Hz short pulse
- 1 MW, 10 Hz short pulse

CERN

EA software “EcosimPro” and its libraries of components have been widely used for the modeling and simulation of cryogenic systems.

The European Organization for Nuclear Research (CERN) developed and validated a set of EcosimPro libraries for the simulation of the CERN helium refrigerators.

ESS

Public funds
Cantabria University initiative
Primary loop design
European Union R&D Programmes
Fusion Activities

- ITER Reactor Activities
- IFMIF Development Activities
- Other Fusion Activities
Empresarios Agrupados has participated in several Design Activities for fusion facilities.

Most of these activities have been performed through international consortiums.

EA is a member of the European Grouping EFET and the Spanish consortium IBERTEF.

EFET was appointed by the European Commission (EFDA) for the design phase activities of the ITER machine.

Empresarios Agrupados has also performed fusion activities supporting CIEMAT in the area of remote handling, technofusion, etc.

EA’s potential and actual clients for ITER activities: IO, F4E, other ITER agencies.
European Union R&D Programmes
ITER Reactor Activities

Project EFDA Task 93/851 GC

Hot Cell Requirements for On-Line & Off-Line Refurbishment

EFDA (2000)

Project EFDA 93/851 GC
Mechanical and civil design for Hot Cell building, RW building, Access Control/Personnel building

EFDA (2001)

Calculation of the electrical system response to ITER loads.

CIEMAT (2003)

Design of the power supply system of the auxiliary services for ITER

CIEMAT (2003)
European Union R&D Programmes
ITER Reactor Activities

Functional Specifications and Facilities of the National Centre of Technologies for Fusion (TechnoFusión)
CIEMAT (2009)

Project EFDA Task 06-915
DEMO conceptual design
EFDA (2007)

Study of RH Engineering in the NB cell (ITER)
CIEMAT (2007)
1994-2003

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 April 1994</td>
<td>Signature of the ITER EDA Framework Contract</td>
</tr>
<tr>
<td>15 July 1994</td>
<td>Signature of the first task order</td>
</tr>
<tr>
<td>Five Extensions</td>
<td>- on 30 July 1996 until July 1998</td>
</tr>
<tr>
<td></td>
<td>- on 23 December 1998 until end of 2000</td>
</tr>
<tr>
<td></td>
<td>- on 13 December 2000 until end of 2001</td>
</tr>
<tr>
<td></td>
<td>- on 18 October 2001 until end of 2002</td>
</tr>
<tr>
<td></td>
<td>- on 25 November 2002 until end of 2004</td>
</tr>
<tr>
<td>31 December 2004</td>
<td>End of the ITER EDA Framework Contract</td>
</tr>
</tbody>
</table>

- EA was a member of EFET from 1994 to 2003
- European Site Studies
2004-2007

- CIEMAT several contracts: IFMIF, Neutral Beam Injection Maintenance, Tritium Blankets Simulation Techniques
- AREVA-TA subcontractor to develop the ITER safety analysis report (several chapters)

*View of the Crane*

*General arrangement of the NB cell, including the remote handling permanent devices (rails and storage structures)*
2007-2009

- CIEMAT several contracts: Technofusion
- Framework contract for civil design. No purchase orders awarded.
European Union R&D Programmes
ITER Reactor Activities

2010

- Fusion for Energy (F4E): Architect-Engineer Contract
  Contract No. F4E-OPE-058-01: Contract for the provision of Civil Engineering and Construction Consultancy Services re: the ITER project
European Union R&D Programmes
ITER Reactor Activities

ITER Buildings

2010-2018: A-E Contract
IFMIF-EVEDA Radiofrequency System Cooling System
SUMMARY AND CONCLUSIONS
## EA Participation in the EU Framework Program - FISSION

<table>
<thead>
<tr>
<th>Seventh Framework Programme</th>
<th>Sixth Framework Programme</th>
<th>Fifth Framework Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOFAST: European Gas Cooled Fast Reactor</td>
<td>EXTREMAT: New Material for Extreme Environments</td>
<td>EVITA: European Validation of the Integral code</td>
</tr>
<tr>
<td>MAX: MYRRHA Accelerator eXperiment, research and development programme</td>
<td>INNOHYP-CA: Innovative High Temperature routes for Hydrogen Production</td>
<td>ASTEC</td>
</tr>
<tr>
<td>ELSY: European Lead-Cooled System</td>
<td></td>
<td>HTR-E: High Temperature Reactors - Equipment</td>
</tr>
<tr>
<td>ESFR: European Sodium Fast Reactor</td>
<td></td>
<td>PDS-XADS: Preliminary Design Studies of an Experimental Accelerator-Driven System</td>
</tr>
<tr>
<td>CDT: Central Design Team</td>
<td></td>
<td>MICANET: Michelangelo Network</td>
</tr>
<tr>
<td>IPROnet: Integrated Plantwide Regulatory Control and Online Optimisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRESCENDO: Collaborative &amp; Robust Engineering using Simulation Capability Enabling Next Design Optimisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVELICO: Optimizing Very Large Industrial Control Systems for the Large Physics Facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JHR-CP: Jules Horowitz Research Facility</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5th to 7th EURATOM Fusion Programme
EFDA Contracts (80)
Activities – ITER EDA Phase, IFMIF and DEMO
2009 (7th FP) – ITER PF Coil Building Design
2010-2012 (7th FP) – ITER Buildings Architect-Engineer
2012 (7th FP) – Tritium permeation analysis in the TBMs
2010-2012 – IFMIF design activities cooling system
LESSONS LEARNED

- Good knowledge of the innovative technologies and new fission reactor concepts
- Relevance of being supported by research organizations, as for example CIEMAT
- Relevance of the Government involvement in the process (CDTI)
- Experience in the work in international consortia
- Opportunities for developing advanced engineering tools
- Execution of the contract with different legislation than those for industrial projects
- Contract model and specific legislation of IP protection are convenient
- Consortium models to be developed for the execution of the activities at site
OUR ADDED VALUE

- Large experience in NPP Design Construction and Operation
- Experience in large projects industry and science
- Familiarity with the ITER project before the decision of its construction
- Proven experience as Architect Engineer of large projects
- Stability and commitment with innovation
- In-depth knowledge of the Nuclear Industry and Fusion Applications
- Quality, Safety and Environmental Assurance Culture in the organization
- International experience
Thank you for your attention!!

Mª Teresa Domínguez

www.empre.es