Asociación Nuclear Ascó-Vandellós II

• ANAV is established to manage Ascó I-II and Vandellós II Nuclear Power Plants

• ANAV is owned by Endesa and Iberdrola:
  • Ascó I: 1.032 MW
  • Ascó II: 1.027MW
  • Vandellós II: 1.087MW

• Power output

• Technology: Westinghouse 3 loop PWR

• Start-up
  • Ascó 1: December 1984
  • Ascó 2: March 1986
  • Vandellós II: March 1988

• ANAV plants currently provide about 50 percent of the electricity consumed in Catalonia, which is equivalent to 8 percent of the total consumption in Spain
**AREVA**

**NUCLEAR ENERGY**
- Uranium exploration, mining and concentration
- Uranium conversion and enrichment
- Nuclear fuel design and fabrication
- Design and construction of nuclear reactors
- Supply of products and services for nuclear power plant maintenance, upgrades and operations
- Recycling of used nuclear fuel
- Project management and support for work in a radioactive environment
- Nuclear site value development
- Nuclear logistics

**RENEWABLE ENERGIES**
- Design and manufacture of high-capacity offshore wind turbines
- Turnkey construction of bioenergy power plants
- Design and construction of concentrating solar power plants
- Development of solutions for energy storage and to produce hydrogen by water electrolysis and electricity with fuel cells

Tony GRANDA  
President AREVA Spain
BUREAU VERITAS

• De la Evaluación de Impacto Ambiental al Desmantelamiento

Ubicación
- Evaluación del Impacto Ambiental
- Permisos y licencias

Construcción
- Revisión del diseño
- Coordinación de Seguridad de Gestión
- "in situ" Inspecciones "in situ"
- Auditoría del Sistema de Gestión
- Estudios de seguridad

Compras, Equipamiento
- Revisión del diseño
- Evaluación de proveedores
- Inspección en fábrica
- Evaluación de la conformidad
- Auditoría del Sistema de Gestión
- Expedición
- Ensayos no Destructivos
- Laboratorios

Puesta en marcha
- Inspecciones
- Ensayos, pruebas presenciales

Operación
- Integración de Procesos QHSE
- Paradas
- Seguridad y Salud laboral (radioprotección)
- Control de emisiones y Calidad del aire
- Auditoría y Certificación del Sistema de Gestión
- Formación en QHSE
- Inspecciones en Servicio

Desmantelamiento
- Evaluación del impacto ambiental
- Seguridad y Salud laboral (radioprotección)
- Inspección y asistencia técnica

Javier CASTELLS
Director Industria
• Wide experience of more than 35 years in Nuclear Industry, present in every Spanish Nuclear Power Plant

• High degree of specialization in maintenance and assembly works in Nuclear Power Plants:
  • Instrumentation maintenance
  • Electrical maintenance
  • Analyzer maintenance
  • Standard energy measuring equipment calibration
  • Chemical laboratory equipment maintenance
  • Meteorological station calibration

• Implementation of electrical and instrumentation design modifications
• Promoting and executing R&D in the fields of energy (all sources), environment and technology, including basic research.

• Carry out its activities in the framework of the EU and cooperate with intergovernmental bodies and R&D centers from other countries. Collaborations with Universities, R&D and enterprise.

• Provides specialized technical services to industry and other public bodies and promotes scientific-technical communication and dissemination, education and technology transfer.

• Special support to the CSN (Nuclear regulator) and ENRESA (Radioactive waste management agency).

• Nuclear R&D Topics:
  - Nuclear Safety, Nuclear innovation, Low & Intermediate Level and High level Radioactive Wastes (characterization & treatment)
  - Structural materials and advanced coolants (molten metals)
  - Radiological protection, surveillance & environmental radioactivity
  - Radiation Metrology and Dosimetry
  - Decommissioning & Dismantling, nuclear security, refurbishment
  - Fusion (ITER, TJ-II, Spanish laboratory of nuclear fusion)
Empresarios Agrupados (EA)

- Founded in 1971, EA is a leading Architect Engineering company in Spain providing a full range of engineering, procurement, construction and plant testing and commissioning services for nuclear and conventional power plant projects.

- Responsible for the architect engineering of six nuclear units in Spain.

- Engineering support services to all eight nuclear units in operation in Spain including modernisation, power uprating, life extension and post-Fukushima analysis.

- Consultancy and engineering services for new build nuclear power plant projects and support to operating plants, both in Europe and USA.

- Currently involved in several decommissioning and radioactive waste management projects in Spain and abroad.
ENDESA a world wide global utility

Present in 10 countries
Installed capacity: 39 GW
Sales: 162TWh
Clients: 25 millions
Employees: 23,000

Nº1 in Iberian electric market
Biggest multinational utility in Latin-America

Present in all the value chain in electricity and gas supply

Latin-America
16,2 GW of installed capacity

Europe
23,2 GW of installed capacity

Endesa installed power distribution by technologies in Spain

Nuclear installed power distribution

Subdirector de Análisis y Estudios de Operación de la Dirección General de Energía Nuclear

Pío Carmena

Vandellós II
Garoña
Trillo I
Ascó I y II
Almaraz I y II
Equipos Nucleares, S.A.

- Since 1973, providing nuclear services and products for the nuclear industry
- Global multi-system supplier
- Integral services: design, licensing, manufacturing and site services
- Products: large safety related components, fuel racks and casks (proprietary designs), heat exchangers, etc.
- Wide presence in France (steam generators, reactor internals, racks and services)
- Long traditional cooperation with French organizations (Areva Group, EDF, CEA, etc.)

Manuel Fajardo
Business Development

María Vega
Business Development VP
ENWESA

- Maintenance Services in Power Plants specialized in mechanical and electrical activities, I&C during operation and outages.
- Nuclear Services: reactor, steam generator, pressurizer, pumps, fuel.
- Specialized in maintenance of all types of valves (in Spain and France)
- New Constructions and systems modifications.
- Automation, control & robotics
- Communications systems and security
- Manufacturing
- High level personnel qualification and important mobile equipment availability for services in Power Plants.
- Certifications ISO, OSHAS, CEFRI and more…
The Nuclear Division of Gas Natural Fenosa Engineering has wide experience in plant operation and engineering support due to the whole life of José Cabrera NPP (WHESTINGHOUSE, PWR 160 Mwe) currently dismantling.

Main field of activities

- Nuclear Safety
- Nuclear Engineering
- Radiological Protection
- Radioactive waste
- Operation support
- Decommissioning and dismantling
- Spent fuel facilities

- UNESA reference on PSA, Human Factor and Safety Culture, Radiological protection and wastes

- Main clients: TRILLO NPP, ALMARAZ I,II NPP, ENRESA, UNESA, CEA, EPRI, UNESA, CSN, F4E
• Largest Spanish Utility and one of the world's top power companies

• Installed capacity: 46,015 MW from which 3,416MW come from Nuclear

• Net production (Q1 2013) of IBERDROLA has reached 36,221 GWh; of which 16,142 GWh were in Spain, and from those 5,991 GWh came from Nuclear.

<table>
<thead>
<tr>
<th>Power plant</th>
<th>Capacity (MWe)</th>
<th>IBD ownership</th>
<th>MWe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cofrentes</td>
<td>1092</td>
<td>100 %</td>
<td>1092</td>
</tr>
<tr>
<td>Almaraz I y II</td>
<td>2094 (1049,43 + 1044,45)</td>
<td>53 %</td>
<td>1110</td>
</tr>
<tr>
<td>Trillo</td>
<td>1066</td>
<td>49 %</td>
<td>522</td>
</tr>
<tr>
<td>Sta. Mª de Garoña</td>
<td>466</td>
<td>50 %</td>
<td>233</td>
</tr>
<tr>
<td>Vandellós II</td>
<td>1087</td>
<td>28 %</td>
<td>304</td>
</tr>
<tr>
<td>Ascó II</td>
<td>1027</td>
<td>15 %</td>
<td>154</td>
</tr>
</tbody>
</table>

Iberdrola owns 43% of Spanish nuclear installed capacity

Beatriz
LIEBANA
Design Engineering Manager
Nuclear Technical Services
IBERDROLA INGENIERÍA Y CONSTRUCCIÓN

• Part of IBERDROLA Group
• A world leading energy engineering company in the areas of generation, networks, renewable and nuclear energy.
• Multicultural team with around 2,200 people, working in nearly 40 countries
• Nuclear Products:
  • Engineering and Construction of New Nuclear Power Plants
  • Operation & Maintenance support
  • Waste Management, Decommissioning & Dismantling
  • Fusion & Accelerators.
• Nuclear Capabilities:
  • Mechanical and Structural Engineering
  • Electrical and Instrumentation & Control Engineering
  • Fuel Engineering
  • Safety Engineering
  • Radiological Protection
  • Radioactive Waste Management
  • Decommissioning and Dismantling of Nuclear Facilities
  • Owner’s Engineering
• Main References:
  All Spanish NPPs, Flamanville 3 NPP (France), ITER-F4E (France), Laguna Verde NPP (Mexico), Angra NPP (Brazil), Ukrainian NPPs, Russian NPPs, Bohunice NPP (Slovak Republic)
IDOM

- IDOM is an independent international company with global presence, in more than 19 countries and more than 2500 people assisting customers in the five continents.

- Our experience in the nuclear sector has its roots in the early nuclear generation projects in Spain.

- Quality assurance; certified by ISO 9001, ISO14001, OHSAS 18001, and certification for homologated supplier for AREVA.

- Field of specialisation:
  - Plant Lifetime and Plant Life Extension (PLIM-PLEX)
  - Stress Test Evaluations (Seismic, Flooding, “Other” natural extreme events)
  - Engineering Design
  - Advanced Analysis (Fluid dynamic analysis CFD, Non-linear stress analyses, thermal modelling, hydraulic modelling, pipe flexibility)
  - Architecture and Design Services – Masterplanning
  - Project and Construction Management & Turnkey Projects

- IDOM main clients: All Spanish NPP, ENRESA, ENUSA, F4E, ITER, ENEL, HOLTEC, …
• LAINSA provides nuclear facilities of any kind with tailored, effective and cost-effective solutions for clean-out, decommissioning, decontamination, waste conditioning, radiological protection and maintenance services (assistance on refueling, revamping and cleaning of HE and SG, metallization, special coating, etc).

• LAINSA is fully committed to constantly improving its services and adopted technologies with the support of GRUPO DOMINGUIS R&D dept. and Innovation Center (in collaboration with the Polytecnic University of Valencia).

• LAINSA participates in the front line to the GRUPO DOMINGUIS internationalization process with its controlled companies, offices and subsidiaries in France, UK, Italy, Mexico and has access to GRUPO DOMINGUIS international networks of controlled and participated companies, that extends also to Middle East, Far East, USA and Brazil.
Nuclenor SA:

- **Santa María de Garoña NPP**
  - GE / BWR-3 Mark – I
  - 466 Mwe
  - Start operation: March 1971
  - Total staff: 330 employees (2009)

- **Owners:**
  - IBERDROLA 50%
  - ENDESA 50%

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Fernando Corchón
Jefe Sección de Ingeniería de Materiales
**TP CEIDEN** is a Spanish entity for the coordination of the R&D needs and efforts in the field of the fission nuclear technology. CEIDEN includes all the sectors (Utilities, Industrial, Services, Regulator, Universities, Laboratories, etc.) related to the nuclear R&D in Spain. Its scope includes NPP currently in operation as well as new designs of reactors. CEIDEN currently manages projects for about 13 M€, contributed specifically by the participants in these projects.

### Current distribution of CEIDEN Members (Total 90+6)

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>Members</th>
<th>SECTOR</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Utilities</td>
<td>4</td>
<td>Engineering &amp; Construction</td>
<td>22</td>
</tr>
<tr>
<td>Fuel Cycle</td>
<td>2</td>
<td>Equipment supply</td>
<td>6</td>
</tr>
<tr>
<td>R&amp;D centers</td>
<td>14</td>
<td>Services</td>
<td>20</td>
</tr>
<tr>
<td>Universities</td>
<td>14</td>
<td>Administration</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>Collaborating members</td>
<td>6</td>
</tr>
</tbody>
</table>

### International relations:

- **European Union**
- Sustainable Nuclear Energy Technological Platform (SNETP)
- Consortium ENSTTI
- **South América**
  - Mexican Network of Education and Investment Nuclear (REMECIN)
  - Latin American Network for Education in Nuclear Technology (LANENT)
PROINSA

• U.T.P.R. Radiological Protection Technical Unit
  • Nuclear Power Plants
  • Radioactive facilities

• Radiological Protection services in N.P.P.
  • Operation
  • Refuelling
  • Decommissioning

• Radioactive Decontamination

• Training on Radiological Protection

• Radiological and nuclear emergencies

• Environmental radiological surveillance

• 28 years of experience in the nuclear industry

• PROINSA’s main clients: ANAV, NUCLENOR, ENRESA, CSN

J Erasmo OTAMENDI
Director

Jesus BERMUDEZ
Technical Director
• Design and construction of complete facilities (systems, structures and components) regarding all technical disciplines:
  • Process (Mass balances, energy balances, P&ID, Equipments data sheets…)
  • Mechanical
  • Electrical
  • Piping
  • Civil and Structures
  • Instrumentation & Control
  • HVAC Systems
  • Fire detection / protection

• Possible Project scopes:
  • Conceptual, basic and detail Design
  • Procurement and Construction (Expediting, Inspection, Construction Management, Quality Control and Quality Assurance, Health and Safety, Environmental Control, Precommissioning, Commissioning and Start-up,…)
  • “Turn key” or EPC (Engineering, Procurement & Construction) projects for processing and power plants.
The Spanish Radiation Protection Society (SEPR) is a scientific and technical association, founded in 1980, whose aim is scientific promotion and dissemination of personal and environmental protection against ionizing and non-ionizing radiations.

The SEPR is an independent, non-profit organization that does not represent any economic or other kind of interest, except those of a strictly scientific and professional nature. Its multidisciplinary nature, reflected in the distribution by sectors of its members, assures its neutrality and independence.

The SEPR is formed by 672 individual members, who are qualified professionals from all the business sectors in which radiation is used. Its members include biologists, physicists, engineers, physicians, chemists and professionals from other sectors, thus ensuring the formulation of rigorous, independent critical analyses. Its multidisciplinary nature is reflected in the distribution by sectors of its members.

**SEPR deliverables**

- Congresses, every 2 years together with the Spanish Medical Physics Societies
- Courses, meetings and seminars
- Collaboration with authorities and institutions
- Publications:
  - RADIOPROTECCIÓN, quarterly journal
  - Specialized Publications
  - Website www.sepr.es
The company was founded in 1963 as Public Limited Company (P.M.L)

We work in several sectors:
  » Nuclear generation
  » NRBC (Military)
  » Information Time Keeping
  » Diversification

In nuclear generation, we work for:
  » MIRION Technologies: more than 30 years of exclusive representation in Spain, leaders for several years on our products and systems in the nuclear field and NBC (RMS, Dosimetry in nuclear, military, medical and environment market)
  » JSPM (wholly-owned subsidiary of AREVA NP): more than 25 years of representation. They are specialized in Reactor Coolant Pumps (RCP), Control Rod Drive Mechanisms (CRDMs) for PWR.

  4 major activities in the PWR sector: Design and manufacture of new parts, Improvement and manufacture of replacement parts, On-site maintenance, Component upgrades of equipment having been operated in NNPP.

Quality assurance: We are approved by the group of quality assurance of owners of nuclear power plants in Spain, as agents of purchase agents.

NRBQ (Military): We work successfully in this sector with RMS, dosimetry systems on military ships, for instance in the most advanced military programs.
TECNATOM

• Tecnatom is an engineering company that has provided services to the nuclear industry since its creation in 1957.

• The company's most significant activities are:
  » Training Centers;
  » Simulation and Simulators;
  » Inspection and Operations Engineering;
  » Inspection and Testing Services;
  » Equipment Design, Development and Manufacturing;
  » Spares Managements;
  » Radiological Protection;
  » Laboratories;
  » Safety Management;
  » Advanced Reactors (Research and Fusion).

• TECNATOM carries out projects in over 30 countries, its working methods having been validated by different clients and regulatory authorities at international level.

• TECNATOM’s GROUP has an strong presence in France, through its subsidiaries METALSCAN and M2M.
• **Técnicas Reunidas (TR)** is a major international general contractor for Power (Nuclear, Fossil-Fired Power Plants, Combined Cycles, Renewables and Cogeneration), Oil&Gas and Infrastructure.

• +50 years of successful growth with +1,100 Projects in Energy Infrastructures. Large EPC lumpsum turnkey experience.

• Independent company from any technology supplier, in any field and from any industrial or electric utility group.

• Listed company in the Madrid Stock Exchange Market, included in the selected IBEX 35.

• Record backlog of 6,616 M€ in 2013; +7,000 employees.

• Most of TR business is concentrated on large turnkey industrial projects, also TR provides engineering, management, start-up and operating services for any type of industrial facility.