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Nuclear Services

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IDOM

Idom is an independent international company that delivers professional integrated services in engineering, architecture and consultancy. Excellency, innovation and commitment are the main basis on which Idom has built a solid group with offices distributed worldwide giving support to projects in more than 120 countries, accounting for 80 percent of the global turnover of Idom.

The market and new requirements of our clients mean that Idom is on a path of continuous growth in the scope of the services being offered as well as in the training of personnel.

At present, more than 2,500 people carry out their professional activities in the Company´s offices and projects all around the world.

THE GOAL

Providing the best possible service to each and every client

1957 Idom was founded in 1957, as a result of the effort and unifying work of the engineer Rafael Escolá (Barcelona 1919 - Bilbao 1995).

1995 Idom obtains accreditation of its quality management system to ISO-9001, awarded by Lloyd's Register Quality Assurance (LRQA).

2000 Idom obtains accreditation of its Environmental Management System to ISO 14001.

2011 Idom successfully gains accreditation to OHSAS 18001 of its Health and Safety Management System.

100% employee owned

The company is employee owned, with 100% of the capital of Idom distributed between staff currently working in the firm.

2500 employees | **12000** clients | **30000** projects



- INDUSTRY & ENERGY
- ARCHITECTURE & BUILDING
- CONSULTING & SYSTEMS
- NUCLEAR SERVICES
- ADVANCED ANALYSIS
- TURNKEY SERVICES
- TELECOMMUNICATIONS
- INFRASTRUCTURES
- ENVIRONMENT

POLAND
BELGIUM
UK
ROMANIA

CANADA
USA
PORTUGAL
MEXICO

SPAIN
MOROCCO
COLOMBIA
UAE

LYBIA
INDIA
CHILE
BRAZIL

In recent years, Idom has expanded the range of its services, both technically and geographically.

IDOM NUCLEAR SERVICES

Idom´s experience in the nuclear sector has its origins in the early nuclear generation projects in Spain in the late 70s and 80s, participating in the construction of Ascó and Vandellós II nuclear power plants (NPPs). Our relationship with these and other projects has continued throughout the lives of these facilities.

Working on these projects has enabled us to acquire technical abilities and experience in the fields of engineering technical support, industrial architecture, civil, mechanical, and structural engineering design and advanced analysis.

Our participation in the Energhia consortium, providing engineering services to Fusion for Energy (F4E) and the ITER organisation in the ITER fusion research project marks a milestone in the development of the nuclear services provided by Idom NS.

The spectrum of activities of the business unit covers a wide range of projects, from minor component or subsystems analysis to major design projects for new facilities.

Idom NS can offer nuclear engineering services working both as an integrated resource within the client's engineering team on site and as a resource from the various Idom offices.

Sustainability and innovation are valued aspects of Idom NS' operations and, together with the knowledge acquired from our projects, we look forward to putting these aspects together to assist our clients on the path to a future with lower carbon emissions.

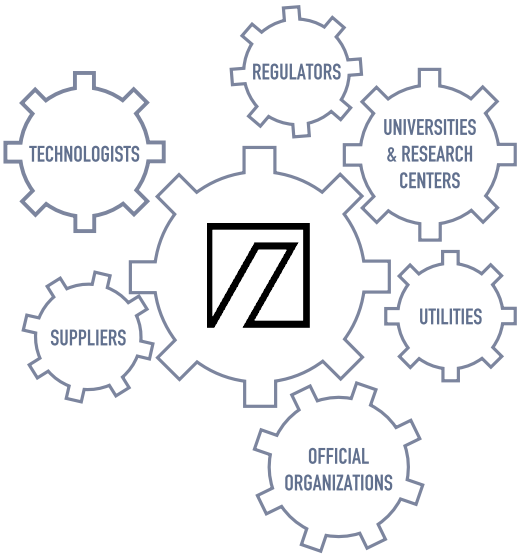
OUR TEAM

Idom NS offers a committed international and multidisciplinary team dedicated to high level performance, ensuring that projects are planned and delivered efficiently. By combining international experience and multidisciplinary expertise, Idom NS adopts a holistic approach to ensure the work is carried out to the client's satisfaction. When required, our core team will receive support from other highly skilled and experienced individuals within the company to ensure that momentum is maintained.

The Idom NS team manages the projects of Idom NS complementing their knowledge and expertise with people from other Idom technical areas working as a Task Force team.

In addition to the certified quality system of Idom, Idom NS operates according to its Nuclear Management and Quality Assurance System, based on UNE 73401, NQA–1 and KTA 1401.

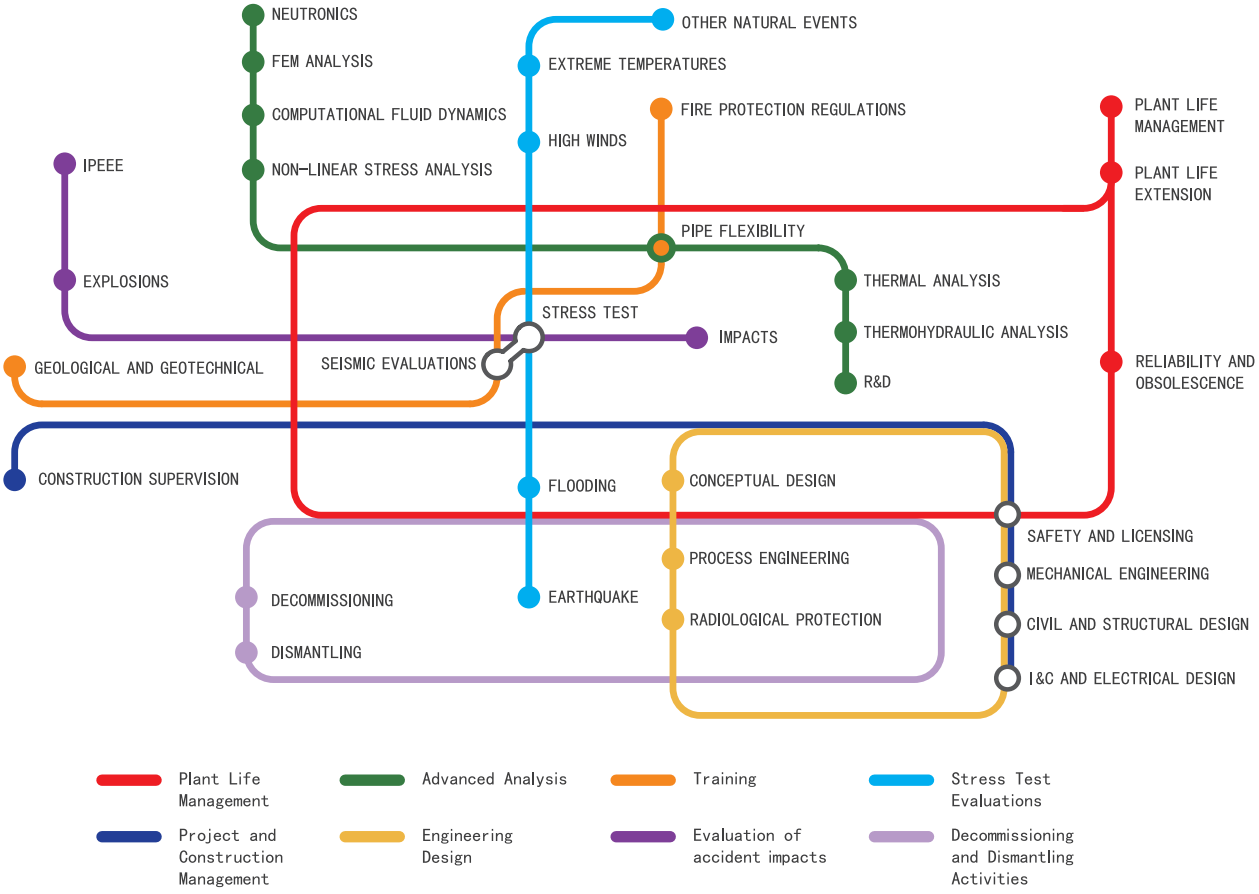
Idom NS is listed in the registry of the Spanish Nuclear Regulator (Consejo de Seguridad Nuclear, CSN), is an approved supplier of AREVA and of all Spanish NPPs and belongs to several communities of suppliers, such as UVBD (UK utilities), REPRO (Southern Europe Oil & Gas utilities industry) and SAGA 7 (Enel-Endesa).



Idom NS is member of the most relevant associations in the field in Spain and Europe: European Nuclear Society (ENS), Spanish Nuclear Society (SNE), United Kingdom Nuclear Industry Association (NIA), Sustainable Nuclear Energy Technology Platform (SNETP) and Spanish Nuclear Forum.

Idom NS is Centre of Reference of the Spanish NPPs for the Electric Power Research Institute (EPRI) projects.

SERVICES PROVIDED BY IDOM WITHIN THE NUCLEAR BUSINESS UNIT



SELECTED CURRENT TASKS RELATED TO THE SAFETY OF THE PLANTS

SAFETY SYSTEMS

Various Safety Related Systems projects have been carried out, from geological and technological studies and site evaluation against extreme natural events, to the development of basic and detailed engineering, equipment purchasing, construction, installation and commissioning of new safety systems of the plants.

Idom NS is also currently carrying out the evaluation of fire protection systems, based on the new Nuclear Safety Council (CSN) IS-30 Safety Instruction, as well as the analysis of emergency Heating, Ventilation and Air Conditioning (HVAC) systems and adequacy to the new regulations.

STRESS TESTS

Idom NS is conducting technical analyses to support the Western European Nuclear Regulators Association (WENRA) stress tests, including safety checks and risk analyses. Our tasks include assessment of the plants' defences against earthquakes, floods and other external events beyond the design basis of the plant, among other aspects.

Idom NS has participated in stress test related services for all the Spanish plants: Ascó, Vandellós II, Cofrentes, Almaraz, Trillo and Santa María de Garoña.

LIFETIME MANAGEMENT

Commencing in 2003 Idom NS developed the necessary studies and evaluations for the Santa María de Garoña NPP operating licence extension. Since 2006, Idom NS has also offered technical support in various areas including planning, development, implementation and monitoring to the Ascó, Vandellós II, Almaraz and Trillo NPPs' Lifetime Management plans.

This task is developed taking into account the considerations included in Safety Instruction IS-22 (CSN document) based on 10CFR54, NEI95-10, NUREG 1800 and NUREG 1801 NRC regulations.

IDOM NS CAPABILITIES

APPLICATION AREAS

- Nuclear Power Plants
- Transport of Radioactive Material
- Fuel Cycle Facilities
- Experimental Reactors
- Application of Radiation Sources
- Radioactive Waste Management facilities

SERVICES OFFERED

On the Radioactive Facilities and Nuclear Power Plants (NPP) market, Idom NS offers a broad range of activities ranging from initial site studies, basic and conceptual engineering to detail projects and/or constructing part of the structures, systems and components (SSC) of the NPP; including ancillary structures, systems and components, process and packaging units, on a turnkey or EPC (Engineering, Procurement and Construction), EPCC (Engineering, Procurement, Construction and Commissioning), EPCM (Engineering, Procurement and Construction Management), CMA (Construction Management as Agent) or PMC (Project Management Consultancy) basis.

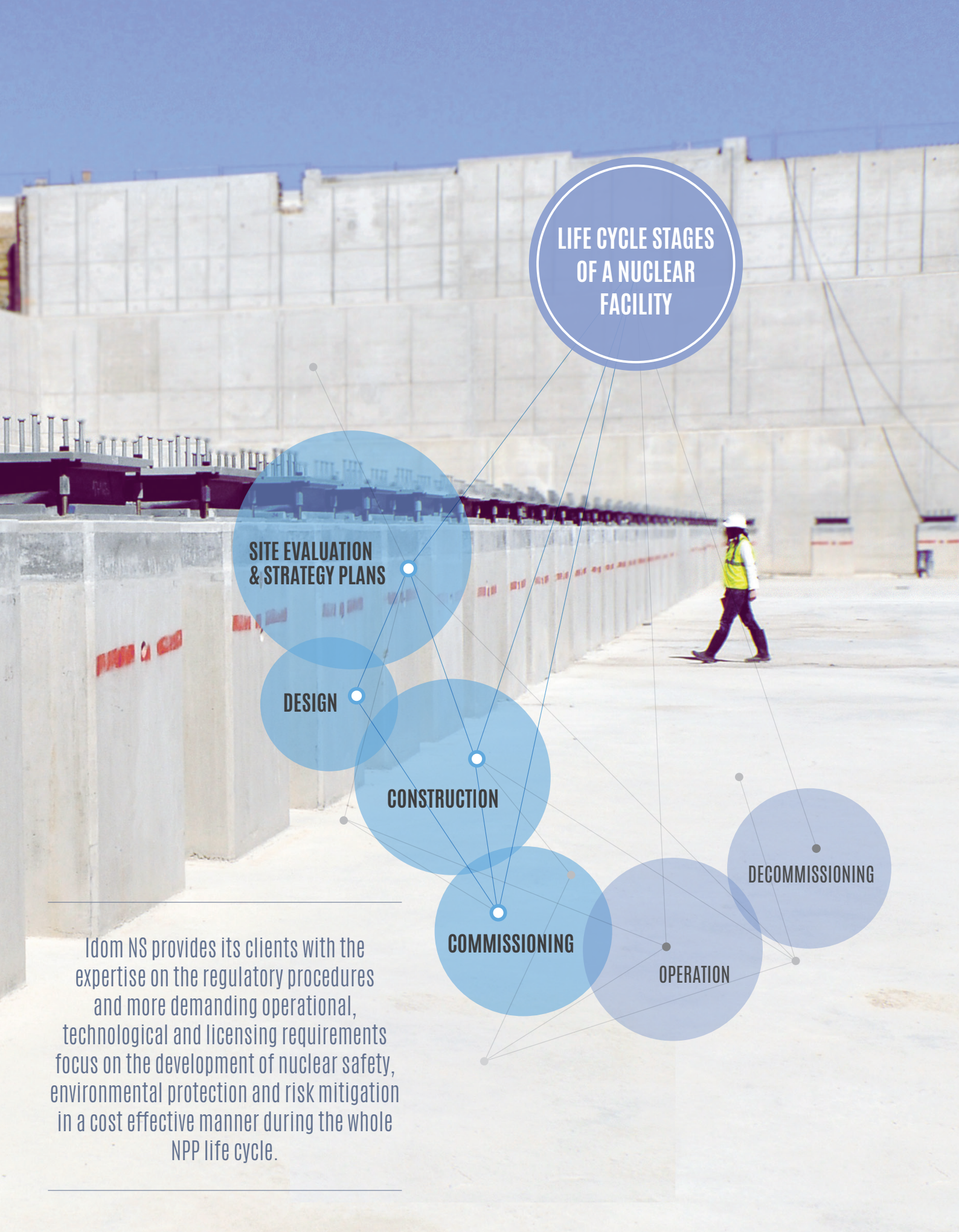
Throughout the life cycle stages of a nuclear facility (site assessment, design, construction, commissioning, operating and dismantling), we provide the client with our expertise on the regulatory procedures and more demanding operational, technological and licensing requirements focus on the development of nuclear safety, environmental protection and risk mitigation in a cost effective manner during the whole NPP life cycle.

In contrast to the NPP original projects, the lessons learned and the operational experience acquired are now included in the design, along with the know-how obtained during the work to extend the operating life of the power plants beyond their design life under safe conditions (Lifetime Management). The requirements resulting from the stress tests applied to the NPP after Fukushima event are likewise included.

Thanks to Idom NS's extensive experience in integration engineering and with a sound relationship with the technology developers in the nuclear sector, we work with many of the suppliers of the nuclear steam supply system (NSSS) and the turbine-generators (T-G) suppliers to be able to provide the client with global support for its requirements.

Idom NS offers a full portfolio of technical services and expertise regarding the different existing fusion (ITER, JET, etc) and fission nuclear technologies, including: Westinghouse Pressurized Water Reactors (PWR), Rosatom Water-Water Reactors (VVER), General Electric Boiling Water Reactor (BWR), Areva European Pressurised Reactor (EPR), Advanced Gas Cooled Reactors (AGR) in UK, etc.

Idom NS stands out for its integration capability and proven experience in ensuring a specific approach for each client in each project. This makes Idom is a reliable partner to undertake multidisciplinary activities based on experience, expertise, commitment and innovation.



Idom NS provides its clients with the expertise on the regulatory procedures and more demanding operational, technological and licensing requirements focus on the development of nuclear safety, environmental protection and risk mitigation in a cost effective manner during the whole NPP life cycle.

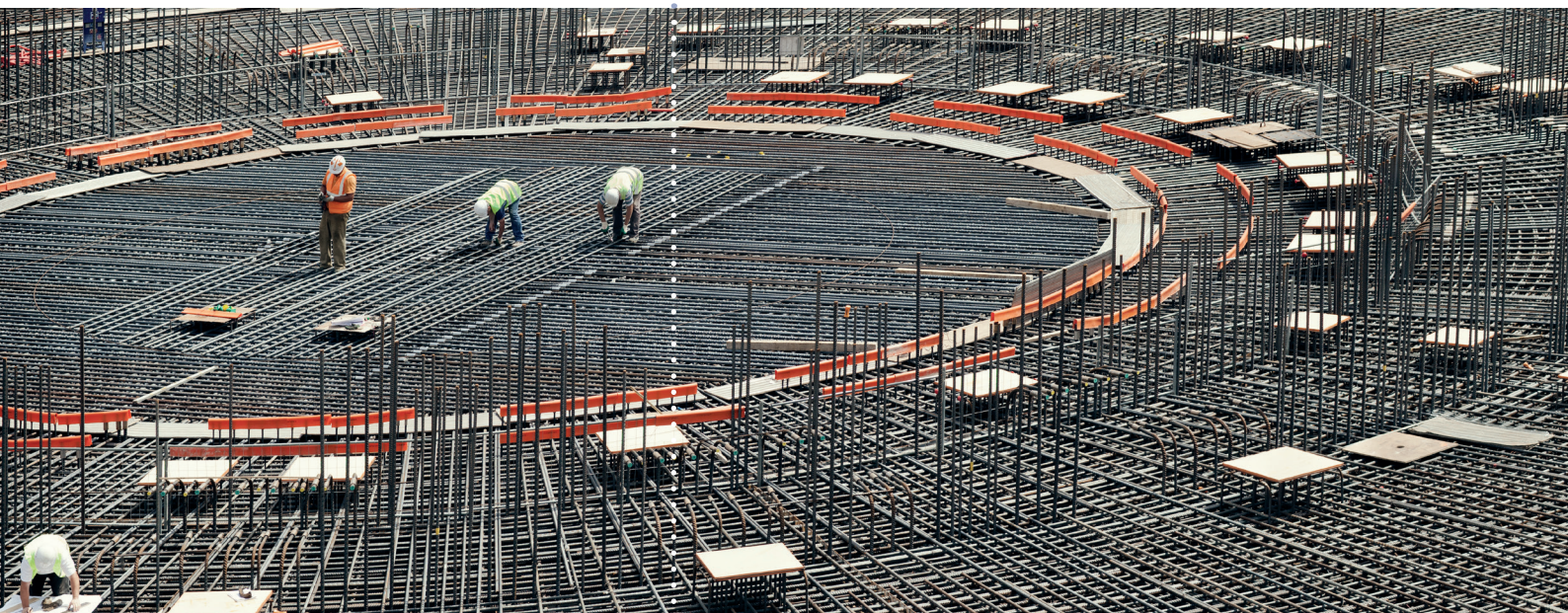
LIFE CYCLE

SITE EVALUATION

- PRELIMINARY STUDIES:
  - Feasibility studies.
  - Technology selection studies.
- SITE STUDIES:
  - Geological surveys.
  - Geotechnical surveys.
  - Hidrological surveys.
  - Site selection.
- LICENSING SUPPORT:
  - Environmental impact study.
  - Radioactive licensing and NPP licensing.

DESIGN

- CONCEPTUAL ENGINEERING.
- BASIC ENGINEERING.
- DETAIL ENGINEERING.
- OWNER'S / SUPPORT ENGINEERING.
- ADVANCED DESIGN ENGINEERING:
  - Thermo-hydraulic studies.
  - Fluid dynamic analysis (CFD).
  - Seismic calculations.
  - Finite element structural calculations.
  - Mechanical fatigue calculations.
  - Fire Protection (FP).
  - Neutronic calculations.
  - Explosion protection.
- SOFTWARE DEVELOPMENT.
- SPECIALIZED ENGINEERING STUDIES:
  - Lifetime management plan.
- QUALITY ASSURANCE:
  - Development of specific quality assurance programmes and quality plans for the project (10 CFR 50 App. B, IAEA-GS-R-3, ...).



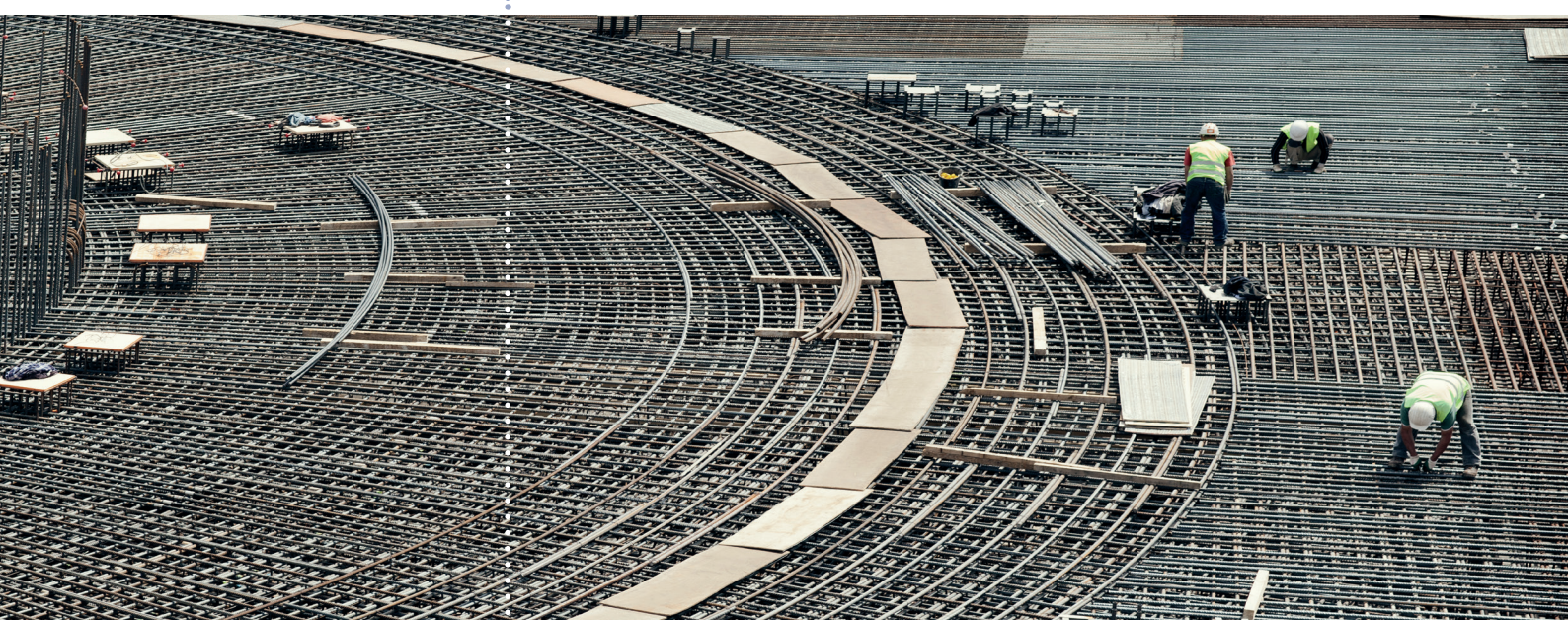
- MANAGING DOCUMENT CONFIGURATION:
  - Document closure in the NPP management system.
- LICENSING SUPPORT:
  - Obtaining administrative permits.
  - Environmental impact study.
  - Safety Studies:
    - Deterministic approach: LOCA (Loss of Coolant Accident) and transitory analyses.
    - Probabilistic approach: PSA.
    - FSAR.
    - TS's.
  - Licensing radioactive and nuclear facilities: construction permit (new facilities) and modification permit (modifications).

CONSTRUCTION

- SITE ENGINEERING.
- OWNER'S / SUPPORT ENGINEERING.
- PROCUREMENT MANAGEMENT.
- SITE SUPERVISION.
- WORKS MANAGEMENT.
- QUALITY ASSURANCE:
  - Factory inspections.
  - Site inspections.
  - Development of specific quality assurance programs and quality plans for the project (10 CFR 50 App. B, IAEA-GS-R-3, ...).
- CONSTRUCTION MANAGEMENT AS AGENT.
- PROJECT MANAGEMENT:
  - Project management.
  - Planning control.
  - Cost control.
  - Risk management.

COMMISSIONING

- OWNER'S / SUPPORT ENGINEERING:
  - Commissioning procedures (FAT/SAT tests).
  - Operating and maintenance procedures.
- ASSEMBLY SUPPORT.
- LICENSING SUPPORT:
  - Obtaining administrative permits.
  - Radioactive licensing and NPP licensing.
- TRAINING.



TECHNICAL DISCIPLINES

The Idom NS integrated approach consists of organising multi-disciplinary qualified teams that provide the combination of depth expertise and required experience and skills.

These are supported by the technical divisions of the Idom group: Consultancy and Systems, Industry and Energy, Architecture and Construction, Infrastructures, Environment, Advanced Analysis, Telecommunications, SerIdom (Integrated Services) and Nuclear Services. All the company's expertise for integral management of the work from the economic, technical, quality, safety, etc. point of view is thus incorporated throughout all the stages of the project: from the preliminary studies to the commissioning of the Nuclear Facility, and including the detail design, manufacturing, construction, assembly and testing of the systems.



The involvement/participation of Idom NS in early stages of design leads to a successful construction development offering services and processes to the client on a construction management as agent basis in which it is ensured an optimal planification, works management, supervision and inspections.



The most usual disciplines included when working on new nuclear facility and / or major design modification projects:

- Drafting and 3D modelling.
- Quality assurance.
- Geology and geotechnics.
- Seismic and civil engineering.
- Electrical engineering.
- Structural engineering.
- Human factors engineering (HFE).
- Financial engineering.
- Instrumentation and control engineering (I&C).
- Materials engineering.
- Mechanical engineering: hydraulics (piping, valves, etc.).
- Mechanical engineering: Heating, Ventilation and Air Conditioning (HVAC).
- Mechanical engineering: fire protection.
- Mechanical engineering: fluids.
  - Thermo-hydraulics.
  - Fluid dynamics.
- Environmental engineering.
- Nuclear engineering: radiation protection.
- Nuclear engineering: criticity.
- Nuclear engineering: radiation transport (shielding, neutronics).
- Process engineering.
- Telecommunications engineering.
- Security.
- Nuclear safety and licensing.

We offer a comprehensive portfolio of technical services and expertise in the different existing nuclear technologies for competitive, reliable and safe operating.

TURNKEY PROJECTS

The Idom group has a technical division (Seridom) that brings the contract specifics in line with the specific needs of the client: from fixed price (EPCC, EPCM,etc.) to *open book* ones. Seridom has a proven track record in constructing major energy facilities from the preliminary studies to their commissioning and being fully operational, mainly including the following aspects:

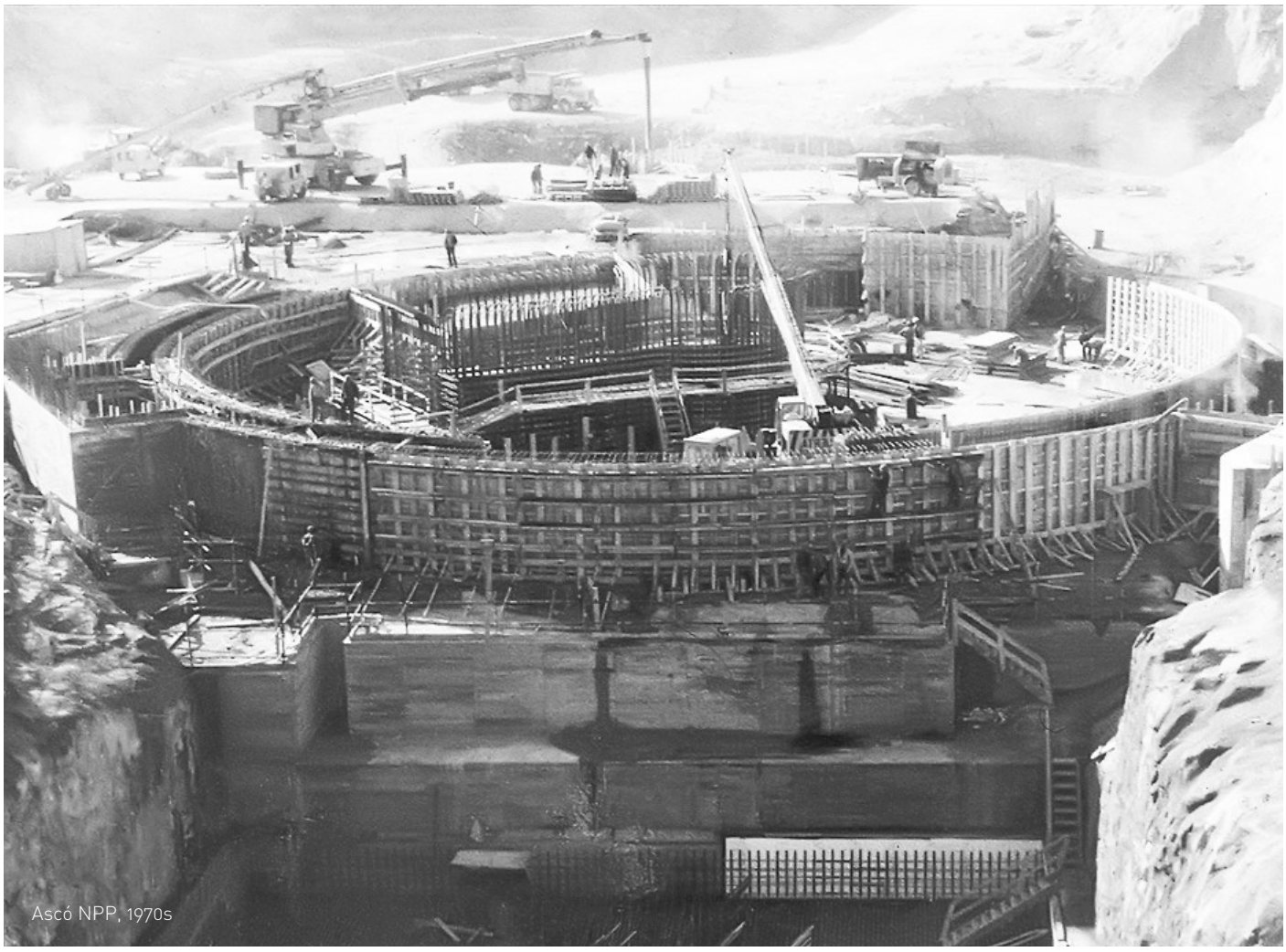
- Conceptual design.
- Project management.
- Detail design.
- Procurement management.
- Materials logistics.
- Construction.
- Commissioning.
- Licensing.
- Operating and maintenance (as per sector and project)

The overall responsibility is thus assumed by a single company that always adapts to the client's requirements.

Over **35 years' experience** in the field of nuclear design

Seridom is endorsed by its many different technology plants constructed, in the following main sectors:

- Thermal solar.
- Nuclear.
- Photovoltaic.
- Combined cycles power plants.
- Cogeneration.
- Automotive.



Ascó NPP, 1970s



MAIN DESIGN SOFTWARE

Idom has over 250 design and calculation software, with agreements in place with the main software development and supply companies, including Autodesk, Bentley, Integraph, Tool, Plaxis, NEA Data bank, etc. The latest versions of the software are available for our clients. The main ones include:

1 3D MODELLING

Smartplan 3D
PDMS
PDS
Enovia
Catia
Autocad
Autoplant
Microstation

2 STRUCTURES

Abacus
SAP 2000
ANSYS HPC

3 PIPING

Caesar II
Autopipe Nuclear
PIPE-FLO
AFT Phatom

4 FIRE PROTECTION (SIMULATION)

FDS

5 THERMO-HYDRAULICS

ANSYS Fluent
HTRI Exchange Suite
Gothic

6 FLUID DYNAMICS

ANSYS CFD
AFT Impulse 5

7 ENGINEERING FACILITIES

MAAP
RELAP
MELCOR
PENELOPE
MCNPX

EXPERIENCE

The Idom NS professional services cover the majority of the technological and industrial engineering activities inherent to a nuclear facility, both in the field of fission and in the fusion activities. Our experience on the nuclear market is not only limited to commercial fission power plants and nuclear reactors, but also includes projects implemented in the context of experimental reactors, such as the Jules Horowitz Reactor (JHR) or the Joint European Torus (JET). Idom NS has carried out numerous projects related to fuel cycle facilities (Independent Spent Fuel Storage Instalation, ISFSI), managing spent nuclear fuel and high-level radioactive waste such as the Centralised Storage Facility (*Almacén Temporal Centralizado, ATC*) and other radiological facilities (hospitals, research centres, etc.).

- Support engineering and site supervision during the construction of the Ascó NPP. FECSA-ENHER. Tarragona (Spain).
- Detail engineering, procurement management, manufacturing, construction, commissioning and licensing of the EJ system as the alternative final heat sink of the Vandellós II NPP. ANAV. Tarragona (Spain).
- Detail engineering, procurement management, manufacturing, construction, commissioning and licensing to modify the GJ (Essential cooled water) and KJ (Emergency diesel generators) system of the Vandellós II NPP. ANAV. Tarragona (Spain).
- Basic engineering for the new Emergency Diesel Generators (EDG) of the Ascó and Vandellós II NPPs. ANAV. Tarragona (Spain).
- Site engineering to construct the new ITER fusion nuclear facility. F4E. Cadarache (France).
- Support engineering for ITER in the civil engineering area. Conducting seismic assessments, explosion and impact analysis, structural calculations and special foundation design. F4E. Cadarache (France).
- Advanced design engineering for thermal hydraulic, fluid dynamic, neutron and mechanical calculations to develop the Test Blanket Modules (TBM), cryo-distribution systems, etc.
- Technical assistance for class piping analysis and support systems of the AP 1000 reactor. Westinghouse. Belgium.
- Detail engineering, procurement management, manufacturing, construction, commissioning and licensing of the emergency control room of the Krško NPP. ANAV. Krško (Slovenia). Joint Venture Idom – Tecnatom. Ongoing project.
- Basic engineering of the Technofusion Getafe 1 and Getafe 2 complexes. CIEMAT. Madrid (Spain).



Safety and sustainability are the most important aspects in Idom operations and together with the expertise acquired from our early to the current projects, we look ahead to help our clients on the path to a future with less carbon emissions.

- Construction of the access building to the controlled zones at Cofrentes NPP. Iberinco. Valencia (Spain).
- Detail engineering and Works Management of the Alternative Emergency Operations Centre (*Centro Alternativo de Gestión de Emergencias, CAGE*) for the Ascó and Vandellós II NPPs. ANAV. Tarragona (Spain).
- Detail engineering and Works Management of the Alternative Emergency Operations Centre (*CAGE*) for the Almaraz NPP. CNAT. Cáceres (Spain).
- Support engineering for operating the Santa María de Garoña NPP. Design modification related to the main HVAC, Fire Protection and Standby Gas Treatment (SBGT) systems.
- Geotechnical survey for the Alternative Emergency Operations Centre (*CAGE*) for the Santa María de Garoña NPP. Nuclenor. Burgos (Spain).
- Geotechnical-geological survey, Detail Engineering, Works Management (awarded) and Licensing of the ISFSI of the Santa María de Garoña NPP. Nuclenor. Burgos (Spain).
- Geotechnical-Geological survey, Works Management and *as built* project to construct the ISFSI at the Ascó NPP. ANAV. Tarragona (Spain).
- Detail Engineering and Works Management to adapt the Pochos and Vaguada waterway at the Ascó NPP. ANAV. Tarragona (Spain).
- Design engineering and Procurement Management of the Container Maintenance Workshop (TMC, *Taller de Mantenimiento de Contenedores*) and of the Empty Container Parking of the Centralised temporary storage facility (ATC, *Almacén Temporal Individualizado*). Enresa. Cuenca (Spain).
- Design and installation of fire protection systems in Ascó NPP storage areas. ANAV. Tarragona (Spain).
- Design of the new seismic fire protection system at Ascó NPP. ANAV. Tarragona (Spain).
- Basic and detail engineering for the filter venting system of the containment for the Ascó and Vandellós II NPPs. ANAV. Tarragona (Spain).
- Project Management to integrate the ITER diagnostic ports. F4E. Cadarache (France).
- Detail Engineering, Procurement Management, Manufacturing, Construction, Commissioning and Licensing of the UGXR Benches of the collimator of the JHR. VTT. Cadarache (France).
- Basic Engineering of the Liquid Metal Laboratory for priority technology development for ITER, IFMIF and future fussion reactors. CDTI. Madrid (Spain).
- Preliminary design of the liquid metal laboratory at Technofusion Getafe 1 and 2. CIEMAT. Madrid (Spain).
- Advanced design engineering for the Sloshing study and of other dynamic effects in the context of the SILER project (Seismic Initiated events risk mitigation in Lead-cooled Reactors). European Union.
- Feasibility studies to implement platforms for air evacuations at the Almaraz and Trillo NPPs. CNAT. Spain.


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