SOGIN GROUP

Sogin has been operating since 2001. It became a Group in 2004 through the acquisition of the majority stake (60%) of Nucleco SpA, the national operator responsible for collecting, treating, conditioning, temporary storage of radioactive waste and nuclear sources from medicine and scientific and technological research activities.
ITALIAN NUCLEAR SITES IN DECOMMISSIONING

Four NPPs
- 210 MW_e GGR (5/63) – Latina
- 160 MW_e BWR (4/64) – Garigliano
- 270 MW_e PWR (10/64) – Trino
- 870 MW_e BWR (12/81) – Caorso

Fuel cycle plants and research reactors
- EUREX (U-Pu) fuel reprocessing and IFEC fuel fabrication plants – Saluggia
- Bosco Marengo LEU fuel fabrication plant
- Plutonium fuel fabrication plant and OPEC spent fuel testing facility – Casaccia
- ITREC (U-Th) reprocessing plant at Trisaia.
- Ispra-1, Research Reactor
SOGIN INTERNATIONAL EXPERIENCE

- Technical Assistance
  - JRC-ITU (Germany)
- Radioprotection
  - Fugro Ocean (United Kingdom)
- Cooperation Agreement
  - ONDRAF (Belgium)
- Engineering support
  - EURODIF (France)
- Support to Waste Management
  - CERN (Switzerland)
- Cooperation agreement
  - Enresa (Spain)
- Technical Assistance
  - JRC-ISPRA (Italy)
- Cooperation Agreement
  - ANDRA / EDF / ITER (France)
- Cooperation agreement
  - SURAQ (Czech Republic)
- Technical Assistance
  - NRPA (Norway)
- Support to Radiation Protection and Nuclear Safety
  - KAPRN (Kosovo)
- Support to Waste Management
  - NSPA (Italy)
- RWM Project
  - European Commission (Republic of Armenia)
- Office, Moscow
  - Russian Federation
- Feasibility Study
  - Sunken Objects (Russian Federation)
- Global Partnership
  - (Russian Federation)
- Office, Rome
  - Italy
SLOVAKIA: PMU for the decommissioning of V1 Nuclear Power Plant in Bohunice (VVER type)

Engineering
- Review of the technical documentation
- Development of technical studies
- Decommissioning Cost assessment

Management
- Contracts management during project implementation
- Review of contractors’ deliverables including design documentation
- Support JAVYS during project implementation
- Control and update the schedule of the decommissioning activities
- Propose measures necessary for mitigation of risks

Procurement
- Review of procurement documentation
- Participation at the Evaluation Committees and support to negotiation with the contractors
PROJECT MANAGEMENT UNIT IN RUSSIA

Global Partnership and Bilateral cooperation between Italy and Russia
- Technical Management of the whole life cycle activities
- Administrative Management of the Programme (approx. 360 M€)
- Implementation scheme: dedicated Italian Russian management unit based in Moscow (10 engineers/experts)

Main achievements:
- Dismantlement of 6 nuclear submarines (e.g., Oscar type 15,000 t)
- Construction of the vessel “Rossita” for the transportation of nuclear fuel
- Construction of the pontoon "Itarus“ for the management of parts of dismantled submarines
- Andreeva Bay: design and construction of treatment and conditioning facilities for radioactive waste
- Construction of ten special steel containers for the storage of highly enriched irradiated fuel
PROJECT IMPLEMENTATION ASSISTANCE TO EC IN THE DECOMMISSIONING OF NUCLEAR FACILITIES

An 8 years Framework Contract with European Commission on Project Implementation Assistance Services for the Decommissioning and Waste Management.

On demand technical consultancy services
- Cost estimation
- Technical specifications
- Feasibility and option studies
- Risk assessments

Licensing and regulatory assistance
- Review of documentation
- Assessment of licensing documentation
- Legal assistance

Project management Assistance
- Review, assessment and development of Decommissioning and Waste management programme
DECOMMISSIONING EXPERIENCE IN NUCLEAR FACILITIES
ARMENIA: Support to Government on RWM

An European Commission funded project.
Strategy for spent fuel and radioactive waste management: analysis of RAW inventory, strategy for the waste management (treatment, conditioning, etc.) and SNF management, legislative proposals (in line with international best practices).

Enhancement capabilities of Armenian Authorities (ANRA, NRSC) for safety review and assessment of radioactive waste management facilities and activities.
DECOMMISSIONING EXPERIENCE IN NUCLEAR FACILITIES
ARCTIC SEA: radioactive sunken objects

An European Commission contract.
To perform feasibility study/action plan for the safe and secure management of sunken radioactive object.
Sogin is leading an European consortium (EWN GmbH - Energiewerke Nord (Germany) , NRPA – Norwegian Radiation Protection Authority (Norway) and NUVIA – (United-Kingdom))

Activities:

• Inventory of all types of sunken objects in the Barents and Kara seas.
• International and Russian norms, standards and legislation, applicable to the underwater operation, the retrieval, the treatment and the final storage of the sunken objects
• Assessment and prioritisation, in terms of hazard, of the sunken objects, based on the potential impact on people and environment
• Feasibility studies for the safe and secure retrieval/management/disposal of the most hazardous objects.
• Action Plan for the retrieval/management/disposal of the selected objects, containing in particular the time schedule and the needed resources
DECOMMISSIONING EXPERIENCE IN NUCLEAR FACILITIES
FRANCE: George Besse-I

Technical support for the decommissioning of the George Besse-I enrichment plant.

• Definition of Plant dismantling scenarios and feasibilities studies.
• Plant Decommissioning Cost estimation and time schedule.
• Investigations on dismantling scenarios versus cost-benefit opportunities.
• Option studies.
DECOMMISSIONING EXPERIENCE IN NUCLEAR FACILITIES
NORWAY: Technical support to NRPA

A 4 years framework contract with the Norwegian Radiation Protection Authority (NRPA)

Technical support on:

• improvement of the radiological safety of population and environment
• site remediation
• orphan sources retrieval
• management of spent nuclear fuel
Sogin recognizes that international cooperation and information exchange bring mutual benefits to the Parties in terms of increased safety, effectiveness and efficiency of technical action and optimization of time and costs.

Then:

- Promote exchange of experience and best practices, in the field of: decommissioning, radioactive waste management and disposal.
- CAs allow Sogin experts to be at the leading hedge of the technology and know-how benefiting of the valuable experience carried out by major players in the sector.

Cooperation Agreement are in place with:

- ONDRAF/NIRAS (Belgium)
- ANDRA (France)
- EDF (France)
- ENRESA (Spain)
- SURAO (Czech Republic)
- ITER (International Organization)
- OECD/NEA
SOGIN
KNOW HOW AND TECHNOLOGY INNOVATION
Identification process of Innovative Technologies that allow to solve and/or optimize operational problems in relation to the decommissioning and radioactive waste management activities.

D&D needs that still present problems to be explored Requirements deriving from the management of challenging waste, for which a consolidated methodology has not been defined

Realizing costumer needs

Highly experienced Engineers

Improving existing products

Developing new products

Patentability Business development

R&D: THE PROCESS OVERVIEW
R&D EXPERIENCE: TOOLS FOR DISMANTLING OF CONTAMINATED STACK

**Purpose:**
- Test of Robotic Equipment
- Set-up of main Parameters

**Tests of:**
- Remote Control System
- Concrete Scarifying Tool
- Concrete Sample Tool

Mock-up of 12 metres high
R&D EXPERIENCE: PU GLOVE-BOX DISMANTLING

In MOX Fuel FP - the matter:
Dismantling of 56 Pu contaminated Glove Boxes in MOX fuel fabrication Plant

The solution:
A PVC alpha tight tent is built around the glove-box. The tent includes an external solid frame structure and an inner flexible PVC film.

It is equipped with gloves which allow to operate inside with appropriate tools.

When opening the contaminated glove-box, the spread of contamination is effectively enclosed by the tent’s film.
R&D EXPERIENCE: TRANSPORTABLE CEMENTATION SYSTEM

In Sites - the matter:
Develop a system able to process different types of radioactive waste (liquid, sludge, powder, etc.) containing β/γ and/or α-emitters. Modular system, transportable and easy dismountable, without any permanent building.

The solution:
SiCoMoR system is realized in separated module:
• Liquid waste receipt and calibration module (MOD-100);
• Cementation module (MOD-200);
• Module for capping;
• Modules for active matrix and capping maturation;
• Module for drum lid closing;
• Service modules (filter module, ventilator module, control module, module for the main electric panels);
Each module is preassembled and transportable and will be coupled to the other modules on the site of installation. Process modules are installed inside a confining structure.
NUCLEAR DECOMMISSIONING
CHALLENGES AND SOGIN APPROACH
NUCLEAR CYCLE

DECOMMISSIONING IS THE NEGLECTED SIDE OF THE NUCLEAR CYCLE

This perception leads to unintended negative consequences on the efficient implementation of the decommissioning activities.

- Lack of vision and strategy
- Underestimated engineering and PM challenges
- Need of further international coordination among D&D companies
- Public acceptance not easier than in the operation phase
- Social issues: workers reconversion from operation to decommissioning
### DECOMMISSIONING: THE NEGLECTED SIDE OF THE NUCLEAR CYCLE

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<th>ISSUES</th>
<th>SOGIN APPROACH</th>
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| Lack of vision and strategy | • Indipendent review of national and/or companies’ deco programmes  
| | • Strategy alternatives |
| Underestimated engineering and PM challenges | • Comprehensive approach based on more than 20 years of experience  
| | • Risk Management based on volatility calculated on almost 30 years of data  
| | • Physical Progress Decommissioning Indicators - PPDI® |
| Need of further international coordination among D&D companies | • World Association for Nuclear Decommissioning and Environmental Remediation – WANDER |
| Public acceptance not easier than in the operation phase | • Stakeholder engagement strategies |
| Social issues: workers reconversion from operation to decommissioning | • Training and knowledge transfer: Sogin Radwaste Management School |
PPDI® PHYSICAL PROGRESS DECOMMISSIONING INDICATORS

PPDI® is a comprehensive approach based on:

- International standards
- Coupled with 20 years of experience

- Radiological Status & Physical Inventory
- 3D Modelling
- Cost Estimate
- Uncertainty Evaluation
- Project Risk
- Monte Carlo Analysis

- NPP BWR
- NPP PWR
- NPP MAGNOX
- Nuclear Fuel Manufacturing Plant
- Nuclear Fuel Cycle Research Plant

INTERNATIONAL STANDARDS

DECOMMISSIONING PROJECTS
SOGIN has developed a proprietary methodology, PPDI® (Physical Progress Decommissioning Indicators), intended to provide a comprehensive approach to nuclear decommissioning.

**Strategy Definition**
- Independent D&D Review
- Project Management: PPDI®
- Decommissioning Strategy
- Decommissioning Organization
- Spent Fuel Management Strategy
- RAW Management Strategy

**Implementation of Selected Strategy**
- Decommissioning Planning
- Design of Dismantling Activities
- Management Planning of RAW
- Management Planning of Spent Fuel

**Support Activities**
- Engineering Services
- Nuclear Safety Assistance & Training
- Radioprotection Services
- Plant & System Characterization
- Decontamination
- Environmental Remediation

**Execution of Decommissioning Activities**
- Care & Maintenance
- In-field Activities
- Treatment of Radioactive Waste
- Spent Fuel Treatment/Storage
EDUCATION AND TRAINING IN SOGIN
The "Radwaste Management School" (RMS) has been operating since 2008, providing education and training to the staff of SOGIN Group and external companies, in accordance with international safety standards and requirements established by the Italian Regulatory Authority. In this way, the RMS guarantees the highest levels of safety in the field of decommissioning and radioactive waste management.

Goals of RMS

The Radwaste Management School aims to:

- train SOGIN Group, with particular emphasis on disciplines related to nuclear safety regarding spent fuel and radioactive waste management;
- promote, improve and extend best practices in the nuclear safety culture, radiation protection and environmental safeguard;
- assure integration, promotion and sharing of knowledge management systems;
- involve universities and international nuclear training centres;
- train young graduates and undergraduates in the field of nuclear decommissioning and radioactive waste management activities.
SEVERAL COURSES IN EIGHT DIFFERENT TECHNICAL & SCIENTIFIC SUBJECTS

Radwaste Management School has been certificated according to rules ISO 9001:2015, ISO 14001:2015 and OHSAS 18001:2007

Decommissioning & Waste Management
(7 courses)

Nuclear Safety and Security
(13 courses)

Radiation Protection
(12 courses)

Nuclear Plant Technology and Training on the job
(specific nuclear plant courses)

Management and Legislative Matters
(5 courses)

Integrated Management System
(8 courses)

Environmental aspects of decommissioning
(6 courses)

Work Safety
(58 courses)
SOGIN – RADWASTE MANAGEMENT SCHOOL
CREDITS AND PARTNERSHIP

Nuclear Operators
(e.g. TAIPOWER, KHNP)

Universities and Research Centers
(e.g. CIRTEN, POLIMI, SAPIENZA, TOR VERGATA, UPO, BARI)

International Organizations
(e.g. IAEA, NEA/OECD, JRC)

Mandatory Nuclear Training for SOGIN Group
INTERNATIONAL TRAINING INITIATIVES

KNOWLEDGE AND EXPERIENCE SHARING WITH INTERNATIONAL NUCLEAR COMMUNITY

• In these years, RMS has been involved with institutional partners and public companies in order to share knowledge and experiences in nuclear field with international nuclear community.

• In particular:
  • International Summer School on Nuclear Decommissioning and Waste Management
  • Chinese Nuclear Safety Authority and Operators
  • Training course for institutional representatives of Socialist Republic of Vietnam
  • Taiwan Power Company
  • Korea Hydro & Nuclear Power
  • ELINDER Project
ELINDER PROJECT

- ELINDER stands for *European Learning Initiatives for Nuclear Decommissioning and Environmental Remediation*

- Over the last years some training initiatives were taken in European countries to improve knowledge, skills and competences in nuclear decommissioning, going from short professional induction training programmes to academic graduate and postgraduate courses. ELINDER supports, coordinates, develops and promotes them in a joint project in cooperation with IAEA.

- Together with Nuvia, Sogin will organize a course on "decommissioning programme and project management". The two-week course will be a "training on the job" which will alternate lessons and visits to various Sogin facilities.
We protect the present 
We guarantee the future