ENES

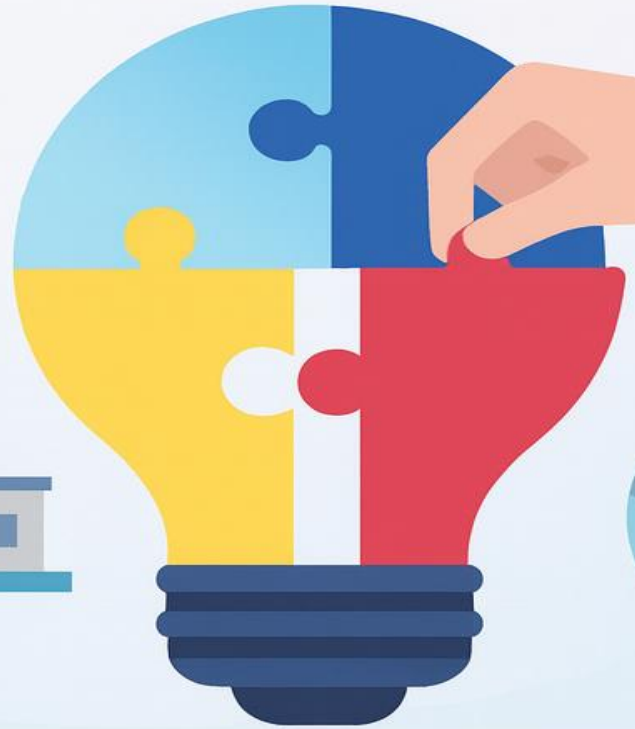
Europe Nuclear Energy & SMR Conference

LTS INNOVATE | FUTURENUCLEAR

ENES 2025 | Oct. 14-15th, 2025 | Prague, Czech Republic

Evaluating Poland's Nuclear Supply Chain and Investment, Local Participation and Future Planning

Piotr Wiśniewski



IAEA

International Atomic Energy Agency

WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

ISO

Piotr Wiśniewski

Specialist with many years of experience in the energy sector, focusing on project management, quality, and integrated management systems.

At PGE PAK Energia Jądrowa S.A., the company responsible for the construction of Poland's first nuclear power plant based on APR1400 technology, he manages the areas of quality assurance and the Integrated Management System.

Graduate of Warsaw University of Technology (Mechanical Engineering) and postgraduate studies in Executive MBA (Polish Academy of Sciences), Nuclear Energy (WUT), Project Management (SGH), and Welding Engineering (Wrocław University of Science and Technology).

Holds international qualifications as IWE (International Welding Engineer) and IWI-C (International Welding Inspector – Comprehensive), and is a certified auditor of quality, environmental, and occupational health & safety management systems (ISO 9001, ISO 14001, ISO 45001).

Lecturer at the MBA in Decarbonization program at Wrocław Business University, teaching process management.

Agenda

1. Poland’s Nuclear Tradition and Current Efforts to Prepare the Supply Chain for New Build Projects

2. New Power Plants localizations

3. Quality & Safety Culture Challenges for Nuclear Supply Chain Suppliers

4. Challenges Poland faces in human resources and suppliers for large NPPs and SMRs, and how will Poland planning be managed?

Poland’s Nuclear Tradition and Current Efforts to Prepare the Supply Chain for New Build Projects

Poland’s Nuclear Tradition

- **Reactor MARIA –** Poland operates its only nuclear reactor; a 30 MW research reactor located in Świerk. Construction began in June 1970 and it was commissioned in December 1974. Today, MARIA is one of Europe’s most important research reactors, producing 10–20% of global molybdenum-99 used in nuclear medicine, serving around **100,000 patients** worldwide **every week**.

- **Żarnowiec and Warta projects** – advanced nuclear power plant plans of the 1980s, with completed site studies and even partial construction.

- **Research centres and supervision** – institutes like NCBJ and the Polish Nuclear Agency (regulator) maintained nuclear knowledge and regulatory capacity even after the 1990s.

This background provides a solid foundation to rebuild competencies and develop the supply chain for 21st-century nuclear projects.

Source: https://www.ncbj.gov.pl/reaktor-maria

Government Actions – Building Competences and Framework

- **Specialized training & workshops** - Programs organized by the Ministry of Climate and Environment help Polish companies build the competences needed to meet nuclear industry requirements.
- **Business missions abroad** - These missions connect domestic firms with international supply chains, giving them first-hand knowledge of standards and opportunities (B2B meetings with eg. Bechtel, Westinghouse, EDF, Framatome, KHNP, Doosan)
- **Supplier Days** - Events jointly organized by PEJ and Westinghouse–Bechtel, such as the 8th edition in Sopot (June 2025, ~100 firms), directly link Polish companies to upcoming tenders.
- **Regulatory framework** - Updates to the Polish Nuclear Power Programme (PPEJ) and amendments to the Atomic Law (2025) accelerate licensing by 12–18 months without compromising safety.

Government Actions – Strengthening Industry and Infrastr.

- **Market analyses** - The study - being carried out by Polish Economic Institute on behalf of Polskie Elektrownie Jądrowe (PEJ), in cooperation with Bank Gospodarstwa Krajowego - aims to determine the potential of the Polish industry for the needs of the nuclear power plant project in Pomerania, as well as solutions that meet the needs of companies related to participation in the investment, such as financial support systems or assistance in obtaining appropriate certificates.

- **Infrastructure development** - Cooperation with GDDKiA, PKP PLK, and the Maritime Office ensures transport routes, rail, and port facilities are ready for large nuclear components.

- **Industrial involvement** - The government has made it clear that the nuclear program cannot be 'just an import of technology', but must serve as a development impulse for Polish industry. Investors are obliged to prepare and enforce **local content plans, aiming for ~40% participation of Polish companies** in each nuclear project.

These actions are just one example of the many initiatives taken by the Polish government. They aim not only at the first NPP, but also at creating lasting competences that will enable Polish companies to join global nuclear supply chains.

Government Support – Free Technical & Quality Workshops

- **Objective:** Strengthening the competences of Polish industry to prepare them for participation in nuclear new build projects.
- **Organized by:** Ministry of Energy in cooperation with IGEOS, Łukasiewicz Research Network – GIT, and Warsaw University of Technology, Faculty of Civil Engineering.
- **Format:** Free technical and quality workshops for construction, electrical, and mechanical sectors.
- **Date & Place**: 6–8 October 2025, Warsaw.
- **Value for suppliers**:
  - Free participation (funded by the government).
  - Access to experts and nuclear industry know-how.
  - Preparation for certification and entry into the nuclear supply chain.

These workshops demonstrate the government's commitment to building lasting competences and ensuring that Polish suppliers are ready for the challenges of the nuclear sector.

Source: https://www.linkedin.com/posts/izba-gospodarcza-energetyki-i-ochrony-%C5%9Brodowiska_energetykajafbdrowa-warsztaty-przemysagk-activity-7367200437575278594-E2mT?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAeZyhwBoyTBgN-OEklc_-lnV1utGUtMoPQ

New Power Plants localizations

Poland’s Nuclear Program – Second Nuclear Power Plant

- **First plant at Lubiatowo-Kopalino** – under development with international partners.
- **Second NPP (EJ2)** – preferred sites at Konin and Bełchatów; other considered sites: Kozienice, Połaniec.
- **Local content strategy** – EJ2 will benefit from competencies developed during EJ1, increasing Polish industry participation.
- **Step-by-step approach** – each project raises the share of domestic companies in construction, supply, and services.

This phased approach illustrates Poland’s strategy: strong reliance on international technology at EJ1, followed by higher local content in EJ2 and beyond.

Source: https://www.facebook.com/polskiatom.govpl

Poland’s Nuclear Program – Implementation Model

1. **Strategic partner selection** – securing proven international technology provider and EPC partner.

2. **Capital and debt financing** – a mix of government guarantees, international loans, and strategic investors, supported by a record state budget allocation of over PLN 60.2 billion (2025–2030), more than 15 times higher than in previous programs.

3. **Involvement of Polish industry** – mandatory engagement of domestic suppliers, aligned with QA/QC and nuclear safety culture requirements.

4. **Participation of end-users** – inclusion of energy consumers and utilities in ownership, ensuring market stability.

This model ensures that Poland’s nuclear program is not only technologically sound but also financially sustainable and rooted in strong domestic industrial participation.

Source: https://www.facebook.com/polskiatom.govpl

Planned SMR Sites in Poland (OSGE – BWRX-300)

Planned SMR Locations.

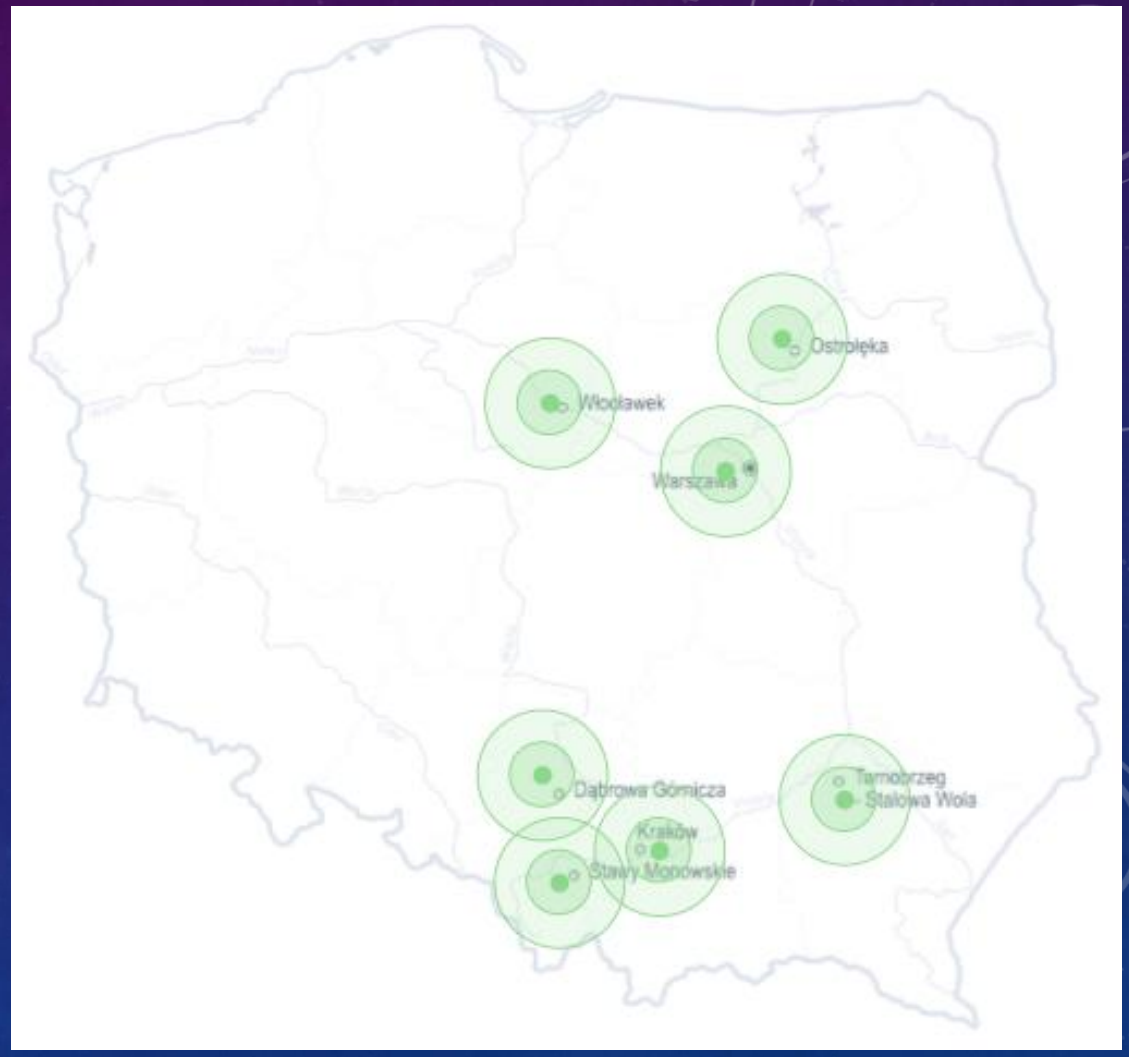
OSGE has identified the first sites for BWRX-300 reactors based on business potential and initial prescreening. Preliminary studies confirmed no geological, environmental, water, or mining factors that would exclude development. Next steps include detailed environmental and geological surveys, with field activities such as seismographic monitoring and drilling.

Confirmed site:

- Włocławek

Potential sites under analysis:

- Ostrołęka
- Warsaw area
- Stawy Monowskie (near Oświęcim)
- Kraków (Nowa Huta)
- Dąbrowa GórniczaStalowa
- Wola (Tarnobrzeg SEZ)



Source: https://osge.com/bwrx-300/00 - OSGE :OSGE

Quality & Safety Culture Challenges for Nuclear Supply Chain Suppliers

Safety Culture in the Nuclear Supply Chain - requirements

Act of 29 November 2000 – Polish Atomic Law (Journal of Laws 2001 No. 3, item 18, as amended)

- Art. 7(3): “The head of an organizational unit shall ensure that nuclear safety and radiological protection are treated as the highest priority and that a safety culture is developed.”
- Art. 36(1)(2): As part of the quality assurance program, the requirements concerning nuclear safety and radiological protection shall be taken into account, in accordance with the principles of safety culture.

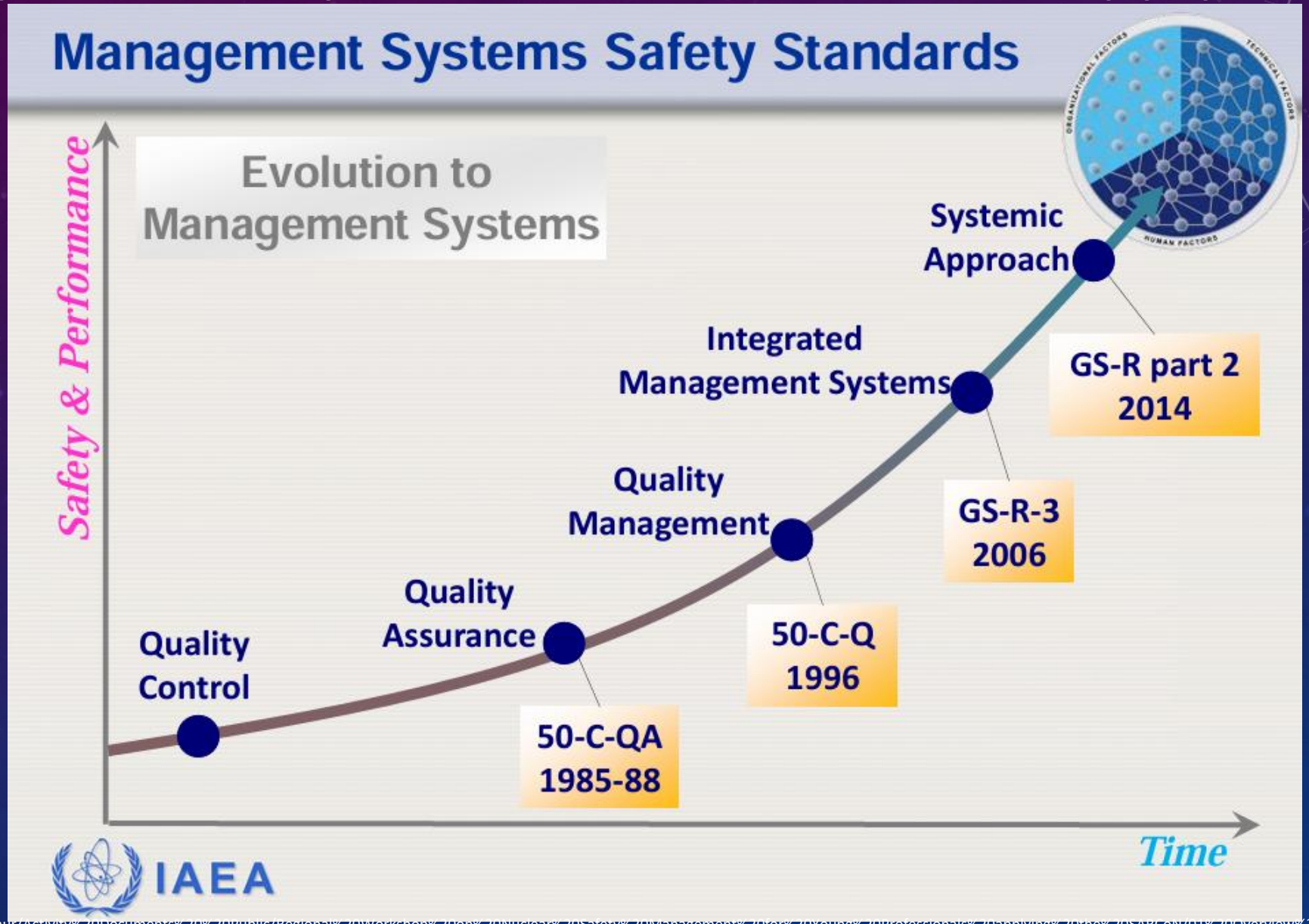
ISO 19443:2018 – Quality management systems — Specific requirements for the application of ISO 9001:2015 by organizations in the supply chain of the nuclear energy sector

- Clause 5.1.3: Top management shall ensure the development and maintenance of nuclear safety culture within the organization.

ASME NQA-1:2019 – Quality Assurance Requirements for Nuclear Facility Applications

- Part I, Requirement 1 (Organization): Management is responsible for nuclear safety and must ensure the promotion of safety culture within the organization.
- Subpart 2.20: Provides guidance for suppliers and sub-suppliers regarding quality programs, including the responsibility for the development of safety culture.

Quality and Safety Culture in the Nuclear Supply Chain



Source: https://gnssn.iaea.org/main/annur/Activity%20Documents%20%20Public/Regional%20Workshop%20on%20Nuclear%20Safety%20Management%20for%20Young%20Professionals%20applying%20the%20SARCoN/01%20Overview%20of%20IAEA%20Safety%20Standards%20and%20Requirements%20on%20Management%20Systems.pdf

Safety Culture - definition

IAEA (INSAG-4, 1991)

"Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance."

WANO (Principles for a Strong Nuclear Safety Culture, 2004)

"Nuclear safety culture is the core values and behaviours resulting from a collective commitment by leaders and individuals to make nuclear safety the overriding priority." The term applies "to every employee in the nuclear organization, from the board of directors to the individual contributor."

US NRC (Safety Culture Policy Statement, 2011)

"Nuclear safety culture is defined as the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment."

Safety Culture by IAEA

Five Key Features of a Strong Nuclear Safety Culture

1. **Safety as the Highest Priority**
   Safety always takes precedence over schedule, cost, or production goals.
2. **Leadership Commitment**
   Managers lead by example, demonstrating visible and continuous dedication to nuclear safety.
3. **Individual Accountability**
   Every employee understands their responsibility for safety and acts accordingly.
4. **Open Communication**
   Issues, concerns, and errors can be reported without fear of reprisal, enabling learning.
5. **Continuous Learning and Improvement**
   The organization systematically learns from operating experience and near misses to prevent recurrence.

Basic Quality & Safety Culture - requirements

Quality Requirements (ISO & NQA-1)	Safety Culture Requirements (IAEA)
ISO 9001:2015 Quality Management Systems, baseline for process approach and continual improvement	**INSAG-4 (1991)** Safety Culture definition: “assembly of characteristics and attitudes...”
ISO 19443:2018 Specific requirements for organizations in the nuclear supply chain; clause 5.1.3 obliges top management to develop and maintain nuclear safety culture	**IAEA GS-R Part 2 (2016)** Leadership and Management for Safety, integrating safety culture into management systems
ASME NQA-1 Quality Assurance Requirements for Nuclear Facility Applications	**IAEA Safety Fundamentals SF-1 (2006)** 10 Fundamental Safety Principles (Principle 3: leadership and management for safety; Principle 5: culture for safety)
ASME NQA-1, Subpart 2.20 QA program requirements for suppliers/subsuppliers, including safety culture responsibilities	**IAEA GS-G-3.1 & GS-G-3.5** Safety culture characteristics and practical guidance for continuous improvement
Integrated Management Systems (ISO 19443/14001/45001 with nuclear adaptations) Ensuring consistent quality across supply chain processes	**IAEA Safety Reports & TECDOCs** Practical tools for fostering strong safety culture and learning from events

Quality Requirements Depend on Reactor Technology Vendor

Westinghouse / Bechtel (USA)

- strong reliance on ASME NQA-1 (Quality Assurance Requirements for Nuclear Facility Applications) and 10 CFR 50 Appendix B.
- suppliers expected to demonstrate QA programs aligned with NQA-1, even without formal certification.

KHNP (Korea)

- requirements based on KEPIC (Korean standards derived from ASME), with equivalence to NQA-1 for export projects.
- integration of ISO 19443 increasingly encouraged for European suppliers.

EDF / Framatome (France)

- requirements built on RCC-E/M & ISO 19443, with strong focus on nuclear safety culture.
- suppliers must comply with European directives and EDF/Framatome supplier qualification programs.

Common approach (all vendors)

- operator (licensee) specifies the QA/QC framework in procurement documents.
- suppliers undergo qualification: questionnaire, system audit (IMS/ISO), QA Program audit (NQA-1/ISO 19443), technical audits.

Depending on the technology vendor, the operator will define which quality standards apply – but in every case, suppliers must integrate nuclear safety culture and graded approach into their systems.

Challenges Poland faces in human resources and suppliers for large NPPs and SMRs

Human Resources Challenges in Poland's Nuclear Program

- **Shortage of nuclear specialists**
  Poland currently lacks sufficient numbers of nuclear engineers, QA/QC experts, certified welders, and reactor operators to meet the needs of large-scale NPP projects.

- **Education & training gap**
  University programs in nuclear engineering and related disciplines have only recently restarted, and the output of graduates is still far below projected industry demand.

- **Competition for talent**
  Skilled professionals are also in demand in other sectors such as renewables, oil & gas, and large infrastructure projects, making recruitment and retention a challenge.

- **Need for international cooperation**
  Poland must rely on international training programs, internships abroad, and collaboration with experienced operators to accelerate workforce development.

Supplier Challenges in Poland’s Nuclear Program

- **Certification requirements**
  Suppliers must comply with demanding standards such as ISO 19443, ASME NQA-1, or RCC-E/M, which often require significant investment in quality systems and audits.

- **Graded approach**
  Different levels of quality assurance are required depending on whether the product or service is Important to Nuclear Safety (ITNS) or non-nuclear; still some number of companies may not be familiar with this concept.

- **Financial and organizational barriers**
  Implementing and maintaining nuclear-grade QA programs is costly, particularly for small and medium-sized enterprises (SMEs), which may discourage their participation.

- **Supply chain maturity**
  Polish industry has strong competencies in construction, mechanical, and electrical works, but limited experience in nuclear-specific procurement, traceability, and documentation control.

Suppliers will need targeted support programs, financing tools, and mentoring to successfully enter and remain in the nuclear supply chain.

Planning & Coordination Challenges

- **Central government coordination**
  The Government Plenipotentiary for Strategic Energy Infrastructure plays a key role in aligning ministries, regulators, and investors to ensure coherent decision-making.

- **Phased project implementation**
  The Polish program is designed step by step: EJ1 → EJ2 → SMRs, with each stage increasing local content and supplier maturity.

- **Regulatory and licensing processes**
  Despite recent streamlining, licensing procedures remain complex and time-consuming, requiring careful planning to avoid delays.

- **International integration**
  Engagement with IAEA, WANO, and NUPIC frameworks is crucial to benchmark Poland's supply chain and workforce against global best practices.

Effective planning and coordination are essential to balance ambition with capacity and to ensure the safe, timely, and cost-effective delivery of Poland's nuclear program.


THANK YOU
FOR YOUR
ATTENTION!
QA