# n.triple.a

#### THE NUCLEAR ATKINS ASSYSTEM ALLIANCE



### A wealth of nuclear experience

Our nuclear team has a combined experience of over 40 years with more than 3,000 staff in the international nuclear sector. Our work covers the entire nuclear lifecycle from government support and energy masterplanning, to nuclear engineering and spent fuel services.

Our active participation in nuclear new build means we are fully conversant with the challenges our clients may face in developing and implementing proposals for a civil nuclear power programme. Our international experience in supporting governments, regulators, utilities and reactor vendors allows us to remain impartial. This not only best places us to support our clients in the development of their programmes, but also allows us to introduce lessons learned from our experiences elsewhere in the world in Gen II/III/III+ technology •

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# The Nuclear Atkins Assystem Alliance.

The Nuclear Atkins Assystem Alliance (**n.triple.a**) is an **independent European nuclear consultancy providing technical and management expertise in the nuclear new build sector.** From early feasibility studies and programme development to operations and regulatory support, our skills cover the full range required to support the development of a new nuclear power programme.

Atkins and Assystem are recognised by key participants in the global nuclear power industry for their engineering expertise and track record.

**Atkins** has a reputation for delivering business critical engineering solutions to the nuclear sector for more than five decades.

**Assystem** has built its engineering reputation in some of the world's safest, most advanced nuclear technologies by working with market leaders in the international new build sector.

n.triple.a combines the strengths of Atkins and Assystem to provide consultancy and engineering services to countries developing nuclear power as part of their energy mix. The Alliance offers support to governments, regulators, vendors and utilities in countries developing nuclear power and provides services for nuclear new build projects across the entire nuclear fuel cycle •



### Expertise across the nuclear lifecycle

Nuclear power programme inception Decision	National infrastructure set-up	Nuclear power plant construction	Nuclear power plant operation ssioning
<ul> <li>Early feasibility studies</li> <li>Strategic plan support</li> <li>Assistance to manage an effective NEPIO</li> <li>Resource and organisational planning</li> </ul>	<ul> <li>Roadmap &amp; policies development</li> <li>Regulation &amp; licensing</li> <li>Building and training a NPP operator capability</li> <li>Workforce planning</li> <li>Siting</li> <li>Environmental impact assessment</li> <li>Emergency planning</li> <li>Technical assessment</li> <li>Commercial approach</li> <li>Project management</li> <li>Security and safeguard design</li> </ul>	<ul> <li>Programme management/owner engineer</li> <li>Design &amp; engineering</li> <li>Testing &amp; commissioning</li> <li>Construction monitoring</li> <li>Risk/quality/safety management and control</li> <li>Interface with regulatory body</li> </ul>	<ul> <li>Periodic safety reviews, outage support, safety and reliability enhancements</li> <li>Design &amp; engineering</li> <li>Interface with regulatory body</li> <li>Plant upgrade design, modification and safety cases, including seismic and hazard defences, boiler upgrade and fuel systems</li> <li>Management of critical life extension projects on behalf of owner</li> </ul>

Training Development of National Capabilities

The combination of Atkins' and Assystem's expertise in nuclear engineering offers **unrivalled skills to clients** in the nuclear new build sector.

Uwe Krueger, Chief Executive, Atkins.

By combining the best of what the UK and France have to offer, we are creating a **powerful alliance** to serve clients around the world.

Dominique Louis, Chairman, Assystem.

# What we **deliver.**

**n.triple.a** is well positioned to add value in solving today's challenges of delivering the next generation of nuclear power plants •

With n.triple.a, clients have the support of an independent and highly credible organisation that will support them from the early stages of a nuclear power programme, through to the specialised area of nuclear engineering and ultimately the delivery of the programme. Our skills cover the full range required to support the development of nuclear programmes from their inception through to operation and decommissioning.

# Our capability.

As a leading global engineering alliance, we work across key sectors worldwide to offer our clients the best service possible. Our unique offering includes:

### Nuclear technologies for new build programmes

Our people have a wealth of technical experience of reactor technologies being proposed for new nuclear build programmes across the world. We are actively employed by government, regulatory and commercial entities in evaluating and licensing these technologies; as a result, n.triple.a is in a position to develop world class nuclear programmes.

### A full range of nuclear and technical skills

We have the ability to provide access to an unrivalled capacity of highly experienced specialists in nuclear power technology and its supporting disciplines. We also have knowledge of the safety requirements, regulatory styles and assessment methods followed by different countries.

### Experience of successfully managing major projects worldwide

Atkins and Assystem have a proven track record of successfully delivering major projects worldwide. Such projects include Sellafield Legacy Ponds and Silos, UK; London 2012; King Abdulaziz International Airport, Jeddah; Burj Al Arab, UAE; Dubai Metro; and Hong Kong International Airport.

We offer:

- > Independence from nuclear vendors and operators
- > A tailored and collaborative approach
- > A specialised training academy
- > An extensive skills base and deep capability

Together, we give our clients access to both the UK and France's largest engineering consultancies and collectively we bring together a worldwide reputation for providing highly developed nuclear engineering skills.

n.triple.a provide support throughout the whole of the nuclear power plant life cycle. Our services include:

DESIGN • DEVELOPMENT • CONSTRUCTION • COMMISSIONING OPERATION AND MAINTENANCE • NUCLEAR WASTE MANAGEMENT • DECOMMISSIONING

Atkins and Assystem have forged a strong relationship through working together on the ITER international nuclear fusion research project in the south of France, planned to be the world's largest fusion reactor.

### **ITER, France**

### **Client:** Fusion for Energy **Role:** Architect Engineer

ITER, the International Thermonuclear Experimental Reactor, is a large-scale scientific experiment to demonstrate the commercial feasibility of fusion power. It is one of the most challenging and innovative scientific projects in the world today, involving parties representing over half of the world's population.

The Architect Engineer role is being delivered to an eight year programme by a 200-strong integrated team at the ITER site in Cadarache. When completed, the site will comprise over forty buildings including the 50m × 200m Tokamak complex, designed to modern nuclear standards.

The role involves:

- > Design of all the buildings
- Pre and post contract services to select, appoint and manage construction contracts
- > Site supervision
- > Master planning and detailed programme management
- > Budget and financial management











### **Technical Support** to Health and Safety Executive on Generic Design Assessment, UK

#### **Client:** Health and Safety Executive (2009) **Role:** Technical Selection / Generic Design Assessment

We have assisted the Health and Safety Executive's Nuclear Installations Inspectorate during the Generic Design Assessment reactor licensing process in the UK. Our role was to help carry out detailed technical assessment of the two reactor designs submitted for Generic Design Assessment:

- > UK EPR developed by AREVA-EDF
- > AP1000 developed by Westinghouse Electric Company

Issues considered during the project include:

- > Internal hazards
- > Civil engineering/structural engineering
- > External hazards
- > Mechanical engineering
- > Management for safety/quality assurance
- > Radioactive waste and decommissioning



We provided support through Steps 3 and 4 of the Generic Design Assessment on both designs. The project was extended with a contract value of over £500,000 and over 25 staff were engaged at its peak.

### Tier 1 Strategic Partner to EDF Energy, UK

**Client:** EDF Energy **Role:** Engineering, safety and environmental services





We are a strategic lifetime partner for one of our key clients, EDF Energy and one of the three tier partners on their technical support alliance. This role provides around 150 man years of support per year to maintain their existing fleet of AGRs and PWR with key contributions in the areas of:

- > Periodic safety review
- > Integrated safety case (licensing) and engineering support
- > Project and programme management
- Technical leadership of fleet-wide post-Fukushima improvements



### Nuclear Environmental Permitting and Regulatory Support, UK

#### Client: Horizon Nuclear Power Role: Regulatory and licensing support

We were awarded a framework contract with Horizon Nuclear Power for regulatory and licensing support as part of a long term strategic relationship for the provision of these services. We are providing technical support and assistance on the Safety and Environmental Case preparation and regulatory and licensing process.

Our support includes:

- Assistance in the preparation of safety case documentation including site-specific Pre-Construction Safety Reports
- Support in preparation of part of the Environmental Permit application
- Independent Nuclear Safety Assessment of nuclear safety documentation
- Preparation of the Management Prospectus to be submitted as part of the Nuclear Site Licence and Environmental Permit applications
- Assistance in production of Nuclear Baseline, Site Licence Condition Compliance and Environmental Permit Conditions.







### **Technical Support** to Application Under UK Generic Design Assessment Technology Selection, UK

**Client:** General Electric Hitachi (GEH)

### **Role:** Generic Design Assessment Support

We supported GE-Hitachi in the Generic Design Assessment process until their withdrawal from the UK in 2008. This project was aimed at planning the development of the client's Engineering Function over a three year period, including establishment of the client's Design Authority and Intelligent Customer capability.

Services included:

- Strategic planning of Generic Design Assessment process with Regulators (NII, EA and OCNS) and GEH
- Translation of the ESBWR design between US and UK regulatory requirements
- Creation of integrated programme and delivery of discrete safety packages report
- Development of a waste strategy to address the full life cycle
- Derivation of UK Discharge Limits based on 'typical' discharges and EA methods
- Identification of Conventional Waste generation, treatment and disposal options
- Comparison of standard plant with Programme and Project Control (PPC) and Control of Major Accident Hazards(COMAH) requirements



Atkins is making **a vital contribution** to Horizon Nuclear Power in the areas of site licensing and safety case support, which are fundamental elements of our programme as we embark on new nuclear build in the UK. I am very pleased to have the calibre of technical expertise and experience that Atkins brings to our team, and have been impressed with their professional approach and **commitment to deliver**.

Alan Raymant, Chief Operating Officer,

Horizon Nuclear Power

Assystem, the French part of the nuclear alliance, n.triple.a, is a trusted and highly professional company, which has supported our key projects for many years. The strong safety culture of this company, as well as the nuclear capability of the team, helps us ensure the delivery of high quality projects.

### Dominique Lagarde, Senior Vice President,

New Nuclear Engineering Generation and Engineering EDF

Project

### Support for the Nuclear Site Licence Application for the Nuclear New Build Project, UK

#### **Client:** EDF Energy **Role:** Support for the Nuclear Site Licence

We provided a range of nuclear sector safety, environmental and engineering specialists to support EDF Energy in the preparation of the applications for Nuclear Site Licences and environmental permits for the UK new build projects. This included input to the management systems and arrangements to support their claims in the management prospectus and applications for licences and environmental permits and consents.

Our work included:

- Specialist input to all aspects of a Nuclear Site Licence application and, in particular, the production of processes, procedures and arrangements to support the requirements of the Conditions of the Nuclear Site Licence and environmental permits
- > Assistance for developing and implementing a programme supporting the demonstration of a capable and intelligent customer, operator and prospective nuclear licensee with underpinning safety culture
- Providing overall project management support for delivery of the NSL and environmental permit applications
- > Assisting with the management of the planning application.









### Flamanville New Build, France

#### Client: EDF Energy / Areva Role: Various - engineering support

The Flamanville New Build is a third generation nuclear reactor of the pressurised water reactor type. This reactor generates around 1,600 MWe of electrical power, and provides enhanced safety and simpler operating and maintenance conditions.

We have developed a range of solutions for outsourcing engineering activities based on long-term partnerships with its clients and to support the specific needs of each individual project.

More than 150 engineers and technicians are involved in:

- > Testing procedures
- > Component reliability studies
- > General installation design and calculations
- > Safety reports management
- Supply management of nuclear equipment and sub-system suppliers
- > Complete design of sub-systems
- > Monitoring of sub-contractors' design work
- > Radiation shielding advice using the ALARA principles
- > Probabilistic safety studies



### Strategic Siting Assessment for New Nuclear Power Stations, UK

### **Client:** Department of Energy and Climate Change **Role:** Strategic Siting Assessment Support

This role involved supporting the Department of Energy and Climate Change in developing the Strategic Siting Assessment (SSA) process to select sites for the next generation of new nuclear power stations.

The Government is using a set of technical criteria to carry out an SSA of eleven industry nominated sites across England and Wales with the support of Atkins.

Two main types of criteria were developed for the SSA:

 Exclusionary, which categorically prevent development in certain locations  Discretionary, which may prevent development in certain locations, depending on the mitigating actions proposed by the developer

We also needed to ensure the criteria considered that sites are sustainable during construction, operation and decommissioning (a period in excess of 100 years). Therefore, criteria needed to take account of the latest forecasts on climate change, sea level rise and protection of various international/national ecological designations.

Government and regulators are currently using the SSA criteria to determine whether each of the nominated sites is potentially suitable for deployment by 2025.

### **ASTRID** (Advanced Sodium Technological Reactor for Industrial Demonstration), France

**Client:** Atomic Energy and Alternative Energies Commission (CEA) **Role:** Owner engineering support in management support, configuration management and technical synthesis

The CEA (Atomic Energy and Alternative Energies Commission) is developing a reactor called ASTRID. The reactor will be an electricity generating prototype reactor of about 600 MWe, running on a fast-neutron core and cooled by sodium. This type

of demonstration unit is essential for testing innovations in order to attain fourth generation criteria before the commercial production phase.

We are working with the CEA to ensure coherence between developments made by CEA engineering units, CEA R&D centres and engineering centres belonging to partners such as AREVA, which are mobilized on the ASTRID project.

### **STEMA** "Station de Traitement des Effluents" Management Assistance, France

**Client:** Atomic Energy and Alternative Energies Commission (CEA) **Role:** Project Management Assistance

As part of the improvement project for the STEL liquid effluent treatment station (Station de Traitement des Effluents Liquides) at Marcoule, France, new buildings were set up in the units used for processing container stripping and cementing 380-litre casks. The project also includes re-housing the existing STEL control room in the cementing building.

### UP 3 & UP 2 800, France

#### Client: AREVA Role: Project management – Contract coordination

The AREVA La Hague facility, in la Manche, carries out the first stage of the reprocessing of spent nuclear fuel. It has the capacity to handle the annual reprocessing of waste from between 80 and 100 nuclear reactors - 1,700 tonnes.

To meet growing demand for treatment, COGEMA (now AREVA NC) was authorised to build the UP3-A plant, which has an annual capacity of some 800 tonnes of spent nuclear fuel from light water reactors, and to build the UP2-800 plant for the same purpose.

Alongside these projects we have been responsible, as project manager for carrying out integrated engineering, for the preparation, co-ordination, and startup of the new plants -UP3 in 1990, and UP2-800 in 1994.

### **UK and Penly** 3 EPR projects, UK & France

#### **Client:** EDF/Centre National d'Équipement Nucléaire (CNEN) **Role:** Contract preparation & management

The Centre National d'Équipement Nucléaire (National Nuclear Equipment Center) is the EDF unit in charge of new nuclear power stations as their architect and lead contractor, and it pilots nuclear projects in France and elsewhere (United States, China and United Kingdom).

The CNEN manages all the nuclear island contracts for UK and Penly 3 EPR project suppliers and maintains links between the different entities, both technical and purchasing, within EDF, whilst controlling the budget and general progress planning.

We have been involved in several technical assistance missions for coordinating contracts on the UK and Penly 3 projects.







As well as our broad experience across Europe, we are also the leading nuclear consultancy in the Middle East and have a multidisciplinary team engaged on nuclear and power projects in Jordan, Oman, Qatar and Kuwait. Our core nuclear business in Abu Dhabi, currently provides support to the nuclear programmes for UAE, KSA and Jordan.

Atkins has been operating in the Gulf Cooperation Council (G.C.C) region for over 40 years, and has a multidisciplinary workforce of over 2000 engineers in the region. Assystem has been based in the region for 15 years with 500 engineers located in the area.

No other organisation is as deeply engaged across nuclear programmes in this region as n.triple.a.

We have also secured and are delivering contracts for Energy and Nuclear projects, as well as potential projects in South Africa.

### Nuclear Power Project, UAE

#### Client: ENEC Role: Lender's Technical Adviser

We have been acting as the Lenders Technical Advisor for the UAE's nuclear power project at Barakah.

KEPCO is the prime contractor, constructing four APR1400 units in the Emirate of Abu Dhabi. We have deployed over 60 engineers, environmental and costing specialists to date, and the advisory contract continues up through to commissioning and operation.

### **Preliminary Safety Analysis Report** for the Taishan EPR Nuclear Plants, China

SOFINEL is a subsidiary of EDF and AREVA NP, responsible for engineering studies of the BNI – Balance of the Nuclear Islands of EPR program, and in particular, for the two Chinese EPR Nuclear plants in TAISHAN.

Since 2003, we have been providing support to SOFINEL in the areas of safety advice, project management, systems operation, equipments and general installation and civil work.

In relation to the safety scope of work this role has involved responsibility for several major safety studies, in particular for the Chinese project, and provided several chapters of the PSAR – Preliminary Safety Analysis Report for the National Nuclear Safety Administration.



# Our locations.

17.

Atkins and Assystem locations worldwide:



#### AMERICAS

Canada Puerto Rico Trinidad & Tobago USA

### EUROPE/AFRICA

Ireland

Italy

Belgium Nigeria Denmark South Africa Finland Norway France Poland Germany Portugal Greece Romania Spain Sweden Switzerland Luxembourg Morocco Turkey Netherlands UK

#### **MIDDLE EAST/INDIA**

Kuwait Bahrain Oman Qatar UAE India Sri Lanka

### ASIA PACIFIC

Australia China New Caledonia Philippines Polynesia Singapore









## Our clients.

#### Alstom

Implementation of introduction training for engineering centres

### AREVA

Commissioning of the French uranium enrichment facility

### **European Commission**

Improvement of the safety and operation of VVER reactors (international cooperation)

### Exelon

Independent review of the capital cost estimates for an ESBWR power plant

### CEA

Management and implementation of an automated waste consignment system

### Department of Energy & Climate Change

Development of Strategic Siting Assessment process to select new sites in the UK

### **EDF Energy**

Support for new build nuclear site licence including environmental impact assessment

### **ENEC**

Acting as the Lenders Technical Advisor for the Barakah nuclear power project, units 1 to 4

### Eskom

Commissioning phases for the two 900MW nuclear power plants in South Africa

### Fennovoima

Production of nuclear new build development plan

### General Electric / Hitachi

Generic Design Assessment technical support

### **Horizon Nuclear Power**

Safety case preparation and regulatory support

### IRSN

Nuclear technical expertise for the French Technical Support Organisation

### ITER

Architect Engineering role for an 8-tier programme (€150M contract)

### NPIC

Provision of Technical expertise on CPR1000 NPP design (China)

### **Ontario Power Generation**

Independent review of plan for Darlington nuclear new build project

### SOFINEL

Engineering studies supporting EPR nuclear fleet

### UK Office for Nuclear Regulation (ONR)

Technical expertise for the Generic Design Assessment of new reactor designs

### Westinghouse

Development of codes and standards for the licensing of the AP1000 in the UK



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