

# Amec Foster Wheeler

Adding value across the nuclear lifecycle



The 8<sup>th</sup> EMUG Meeting  
6<sup>th</sup> – 7<sup>th</sup> April 2016  
London  
England

# Welcome

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**“ Describing Amec Foster Wheeler?  
Excellence in delivery, a highly-  
integrated and people oriented  
business producing high-value  
solutions for our customers.”**

**Ian McHoul**, Interim CEO & Chief Financial Officer 

# Shaping the future of nuclear energy

## Global lifecycle capability and support



**3,300**  
dedicated specialists



**Leading** the way in  
**Technology**  
and **innovation**

**60**  
Years'  
global  
nuclear  
experience

World-leading  
**expertise**  
combined with  
**LOCAL**  
capability

# NUGENIA and Other Activities

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- ▶ Amec Foster Wheeler has a presence in most Technical Areas but are especially so in TA03 and TA04.
- ▶ Active research contributions:
  - SOTERIA – radiation effects in nuclear structural materials
  - INCEFA+ – Environmental fatigue on NPP components
- ▶ We participate in TA02 – Severe Accidents.
- ▶ We look to establishing a consortium to set up a high temperature corium eutectic interactions test facility within England by the early 2020s.
  - Currently looking at feasibility studies.

# Unique laboratory services and world-class research

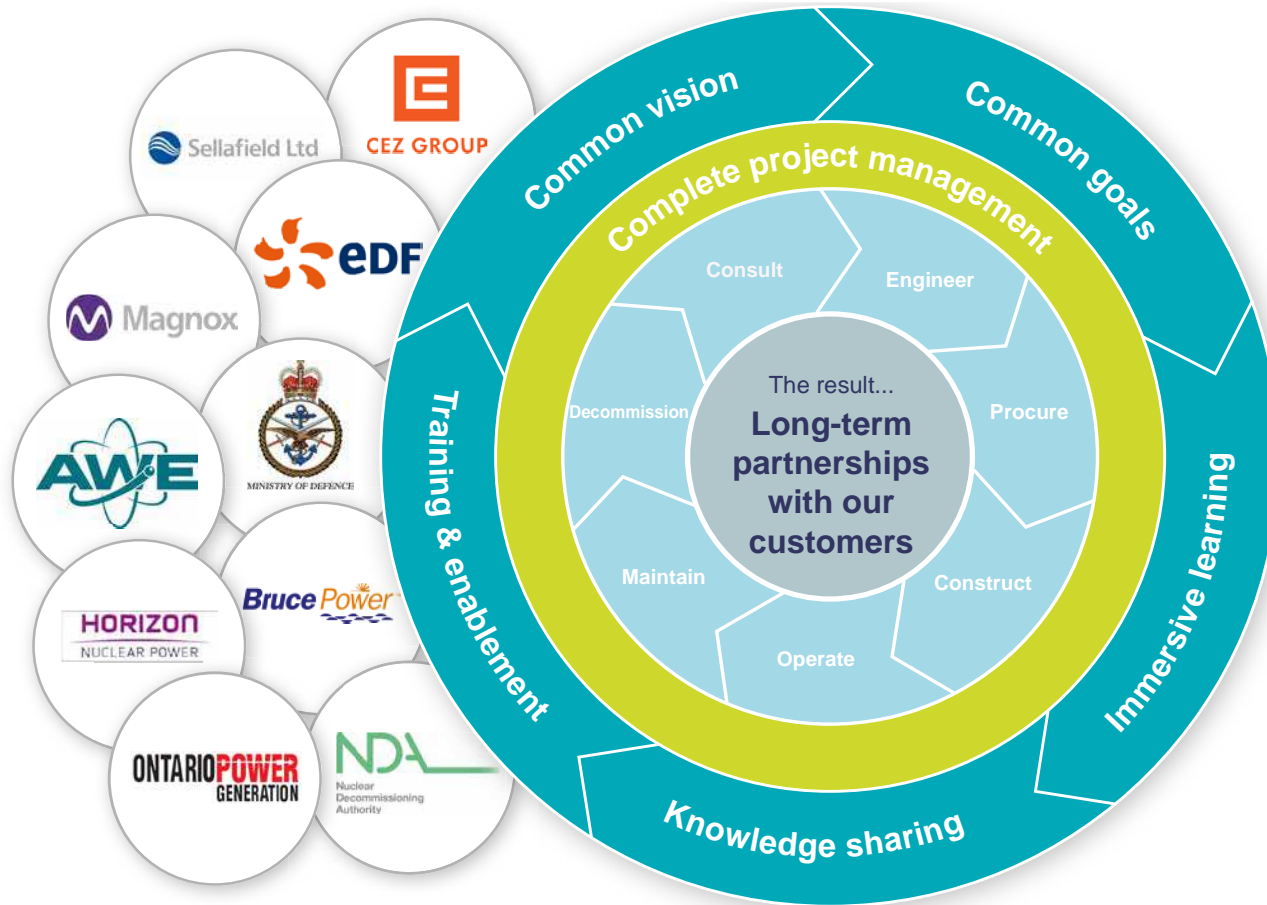
## The UK's largest commercially operated nuclear laboratories

- ▶ Comprehensive (>5000m<sup>2</sup>) laboratory & engineering test rig facilities (active & non-active)
- ▶ 700 staff majority PhD or first degree
- ▶ Operate radiochemical laboratories on behalf of the UK Environment Agency and Sellafield
- ▶ Largest provider of R&D to EDF Energy for continued operation and lifetime extension of UK fleet
- ▶ World leader in R&D for PWR materials corrosion
- ▶ Technical adviser to the UK civil nuclear regulator ONR





# Partnering to shape the future in nuclear energy



Amec Foster Wheeler supports its nuclear customers across the entire asset lifecycle – partnering from concept to clean up

**The result...**  
Long standing, mutually beneficial working relationships

# The Ministry of Defence

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**Heritage of support to the Royal Navy since 1958. We have a presence at every nuclear defence site in the UK.**

- Independent Nuclear Assurance (Advice & Assessment)
  - Safety & Technical support in Design, Build & Operation
  - ~130 SQEP staff with average of ~20 years nuclear experience
  - Topic areas include EC&I, Mechanical Engineering, Thermal Hydraulics, Severe Accident, Reactor Physics and ALARP
- Research & Technology
  - Research Services – Laboratory & Computer Modelling
- Regulatory Support
  - Ring-fenced service separate from Independent Nuclear Assurance to support the defence sector
- Support to Faslane naval base in Scotland
  - Safety case and design support

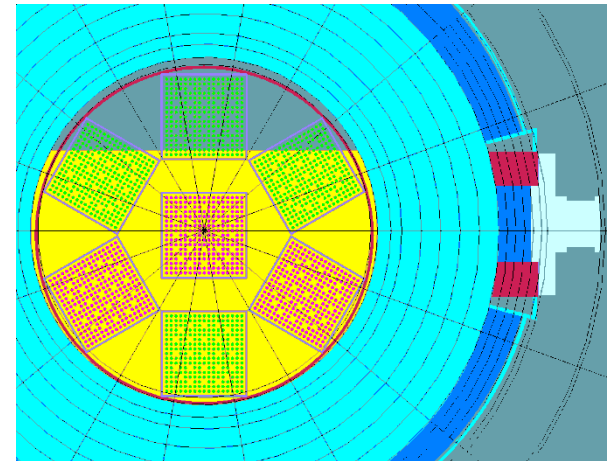
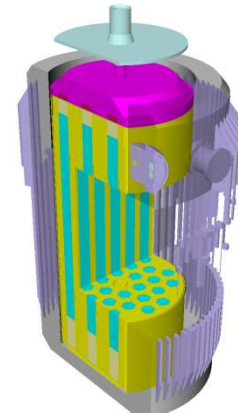
## Example Projects

- Support to Trafalgar & Astute Classes operation & build
- Independent Nuclear Safety Assessment of Vanguard & Astute Classes through-life safety cases & lifetime extensions
- Independent Technical and Nuclear Safety Assessments for PWR3 project
- Emergency Response unit
- Support to prototype Shore Test Facility
- Research into Microstructural effects on Environmentally Assisted Corrosion
- Core Materials testing

# The ANSWERS codes

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- ▶ Provide software and consultancy to assure the safety and performance of nuclear facilities world-wide.
- ▶ Developer of an internationally renowned reactor physics software suite, ANSWERS:
  - MCBEND – monte-carlo shielding
  - RANKERN – deterministic shielding
  - MONK – criticality
  - WIMS – core physics
  - FISPIN – radionuclide inventory
- ▶ Recognised standard software tools
- ▶ International user-base across 35 countries





# Severe Accidents Expertise

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- ▶ A dozen highly specialised severe accident experts across the UK, specialising in every phase of the severe accident transient, for LWRs.
- ▶ Code expertise in MELCOR, MAAP, SOPHAEROS, CONTAIN
- ▶ Perform dedicated analyses for legacy plants and new build in the civil sector
- ▶ We're a major contributor to leading edge severe accident research in the naval sector, in collaboration with Rolls-Royce.
- ▶ We regularly represent the UK at the major events such as CSARP.

# MELCOR Activities

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- ▶ MELCOR has been used to model British naval LWRs since the mid 1990s.
- ▶ Unique naval plant and core design – a great challenge to MELCOR but a testament to the code's versatility.
- ▶ This has led to a deep knowledge of MELCOR and its work-arounds, limits and caveats
- ▶ Recent civil applications of MELCOR include modelling UK-ABWR to be built in Wales.
- ▶ Developed the MELCOR DeckGen tool.
- ▶ Fusion version of MELCOR applied to ITER Projects (Andrew Grief and Simon Owen)

**“When you tire of London, you tire of life.”  
Samuel Johnson, 1777**

**Welcome to London.**



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