

n-eboc15

nuclear energy business opportunities conference

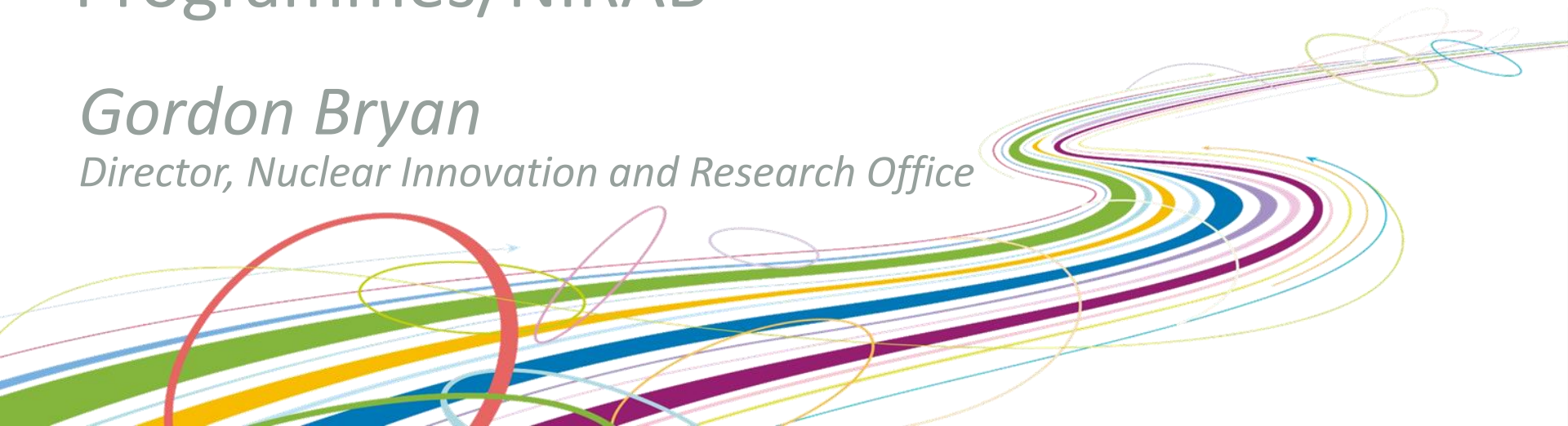
BRITAIN'S ENERGY COAST™
BUSINESS CLUSTER

Event partner NATIONAL NUCLEAR
LABORATORY

Update on UK National Programmes/NIRAB

Gordon Bryan

Director, Nuclear Innovation and Research Office





Update on UK National Programmes / NIRAB

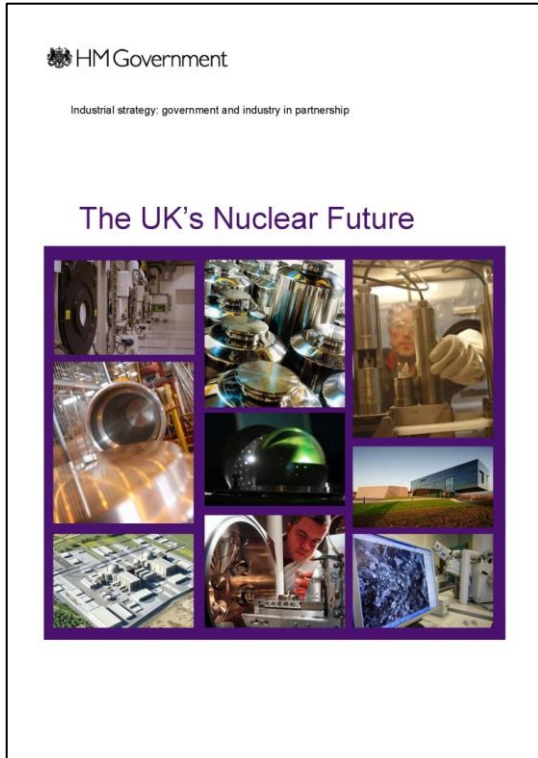
Nuclear energies business opportunities conference 2015

Gordon Bryan

Director, Nuclear Innovation and Research Office



Nuclear Industrial Strategy



Government and industry set out a vision for the UK nuclear industry

“A vibrant UK nuclear industry that is an area of economic and strategic national strength, providing the UK with a safe reliable and affordable supply of low-carbon electricity”

“...the Government will set up a Nuclear Innovation Research Advisory Board comprising of Government scientific advisors, academic experts, the Research Councils, TSB, NDA, and business leaders.”

Role of NIRAB

- To advise Ministers, Government Departments and Agencies on priorities for UK nuclear R&D and innovation
- To support the development of new R&D and innovation programmes to underpin policy (e.g. energy and industrial policies) and the associated business cases
- To foster greater cooperation and coordination across the UK research and innovation landscape
- To oversee the development of a coordinated international engagement strategy

*NIRAB is unfunded and does not commission or carry out research.
Scope limited to civil nuclear*

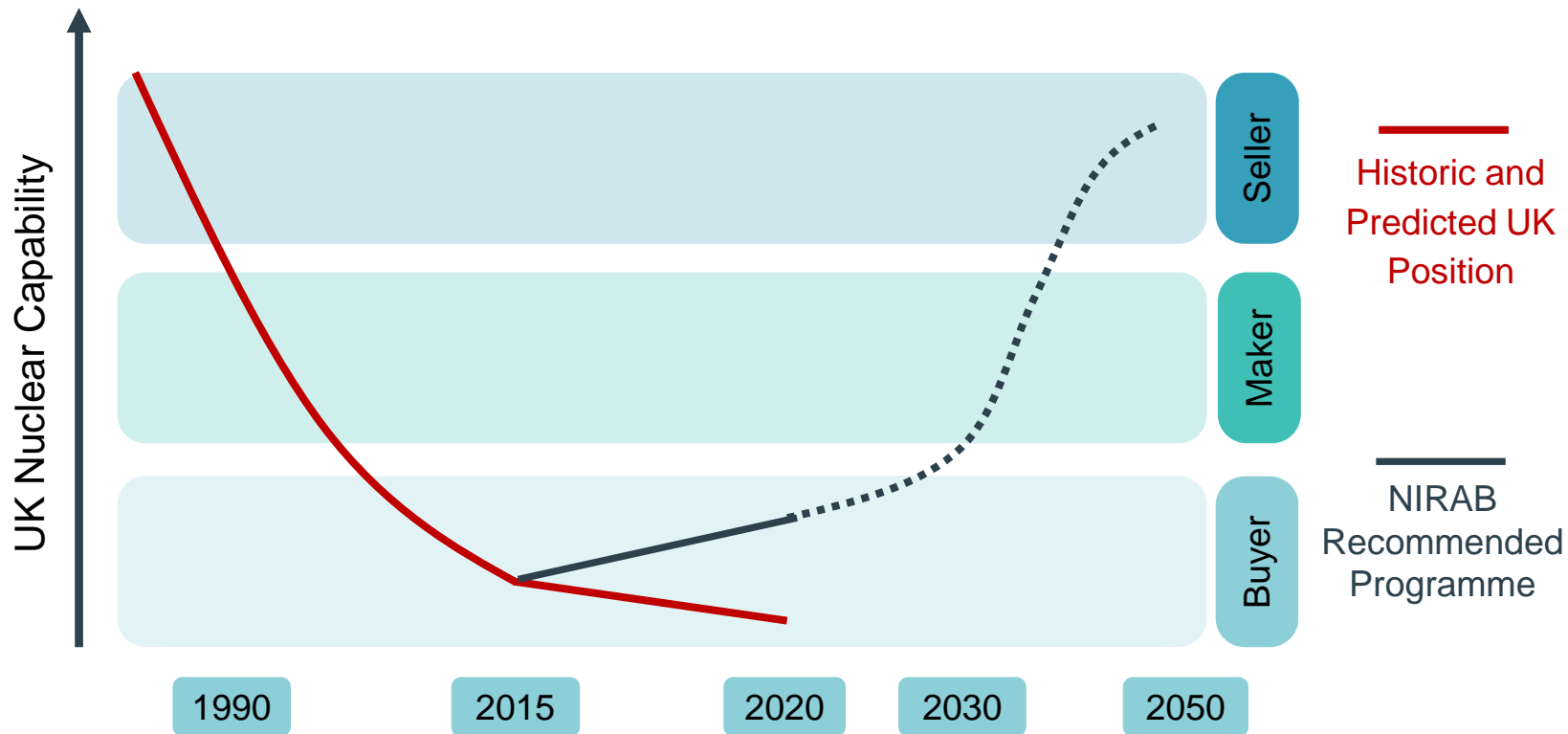


Policy Drivers

Energy policy Department of Energy & Climate Change			Industrial policy Department for Business Innovation & Skills		
Cost reduction	Low carbon options	Security of supply	Economic growth	Skills / capability	World class science
Development of technologies which reduce the cost of electricity to the consumer.	Develop / evaluate technology options to deliver (low carbon) nuclear power	Development of technologies capable of improving sustainability and security of supply	Creation of IP or jobs which can subsequently be used to generate revenue for the UK, contributing to general economic growth.	Maintaining and developing specialist nuclear skills and capabilities	Carrying out programmes to deliver world class / cutting edge science



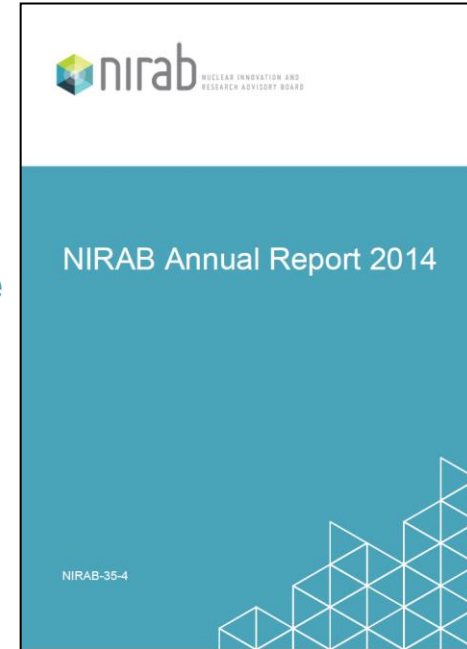
Why Now?



Annual Report

Key recommendations

- Urgent need to address the looming high end skills crisis facing both civil and defence sectors
- Requirement for sustained programme funding spanning the whole fuel cycle
- Government action required to address market failure
- Recommend allocating an additional £250M over the next 5 years



Recommendations / project themes

Recommendations for 5 main projects

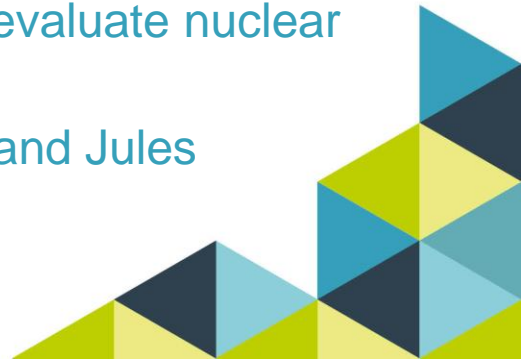
- Making the fuels of the future
- 21st century manufacturing
- Next generation reactor design
- Advanced spent fuel recycling
- Strategic toolkit



Recommended projects (1)

Making the fuels of the future

- Collaborating in the development of Accident Tolerant Fuel for LWRs
 - Development and fabrication of more resistant cladding materials
 - Development of more robust and efficient fuel
- Development of manufacturing techniques for fast reactor fuels
 - Initially Pu containing fuels, followed by minor actinide containing fuels
- Development of coated particle (TRISO) fuels
- Participation in international programmes to generate and evaluate nuclear data
- Maintain access to international test reactors (e.g. Halden and Jules Horowitz)



Recommended projects (2)

21st century manufacturing

- Nuclear materials and manufacturing development
 - Modelling and testing of materials during near final shape manufacturing (e.g. HIP, EB welding and additive manufacturing)
 - Testing materials in conditions representative of operation (temperature and radiation)
- Mechanisation and automation of component manufacturing
- Large scale manufacturing and assembly
- Modular construction



Recommended projects (3)

Next generation reactor design

- **Develop system and component design capability**
 - Innovative architectures and components, digital and virtual engineering
- **Design analysis and verification**
 - Thermal hydraulics, multi-scale modelling and simulation, C&I, verification and validation
- **Design justification**
 - Design for security and safeguards, safety case methodologies, C&I
- **In service operation and maintenance**
 - Remote handling / robotics, equipment health monitoring, inspection and repair technologies

UK priorities identified as SFR, HTR and SMR.
MSR worthy of further evaluation to identify development needs



Recommended projects (4)

Advanced spent fuel recycling technologies

Developing spent fuel recycling technologies with improved economics, proliferation resistance and environmental impact

- Improved aqueous recycling flowsheet for LWR fuel
- Improved aqueous recycling flowsheet for fast reactor fuel
- Pyroprocessing capability for fast reactor fuel
- Waste management techniques for novel wastes arising from advanced reprocessing technologies



Recommended projects (5)

Strategic toolkit

- **Further development of strategic assessment tools**
 - Further development of fuel cycle modelling tools, further development of Generic Feasibility Assessment tool
- **Evaluation of a range of fuel cycles using strategic assessment tools**
 - Evaluate a range of reactor technologies (e.g. MSR) and fuel cycles (e.g. Th)
- **Public engagement**
 - Including development of evidence based tools and methods, data gathering and developing strategies to engage with the public



Current status

- NIRAB made recommendations to Ministers in early 2015
- Next Annual Report to be published early in 2016
- Future research programmes will be dependent on the outcome of the current Spending Review
- Some announcements made:
 - Grants worth £7.5M placed in 2015 for research facility development
 - £4.5M for an SMR techno-economic assessment - underway
 - £60M allocated to National Nuclear User Facility over next 6 years
 - £50M for a research and innovation centre to be jointly funded by UK and China



Contact details

To find out more about NIRAB visit:

www.nirab.org.uk

Contact Sue Ion at:

NIRABChair@niro.org.uk

Contact Gordon Bryan at:

gordon.d.bryan@niro.org.uk

01925 289972

