



# Growing skills for **R**eliable **E**conomic **E**nergy for **N**uclear

## The **GREEN** Centre for Doctoral Training

Nuclear Academics Discussion Meeting, September 2021  
Professor Colin Boxall, Lancaster University  
Standing in for: Professor Scott Heath, University of Manchester



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# Overview



Building on the success of predecessor CDTs Nuclear FIRST and NGN, the mission of GREEN is, in collaboration with industry, to provide high quality research training in the science and engineering underpinning nuclear technologies (primarily TRLs 1-3), developing the subject matter experts of tomorrow

2019-2027: target of 90 PhD students  
£6M from EPSRC, £4.1M from Industry, £2.8M from HEIs



16 Industry partners



# Areas

## Current Nuclear Programmes

- Spent Nuclear Fuel and Nuclear Materials Management
- Decommissioning and Clean-Up
- Geological Disposal
- Current Operating Reactors
- Nuclear Security

## Future Nuclear Energy

- Fusion
- Future Fuel Cycles
- Advanced Nuclear Reactors: Liquid Metal Cooled, Molten Salt, Gas Cooled
- Co-generation

## Nuclear Energy in a Wider Context

- Regulation
- Manufacturing
- Interaction of Infrastructure and Environment
- Societal Issues including Economic & Finance
- Management



# Model



## Three submission rounds for project proposals

- Industry suggests projects attached to half studentships; Universities match if of interest / have expertise
- Universities suggest projects attached to half studentships; Industry provides match if of interest / relevance
- University partners submit whole studentship projects
- **Resulting in leverage of 2:1 with respect to EPSRC funded studentships**

## Management structure

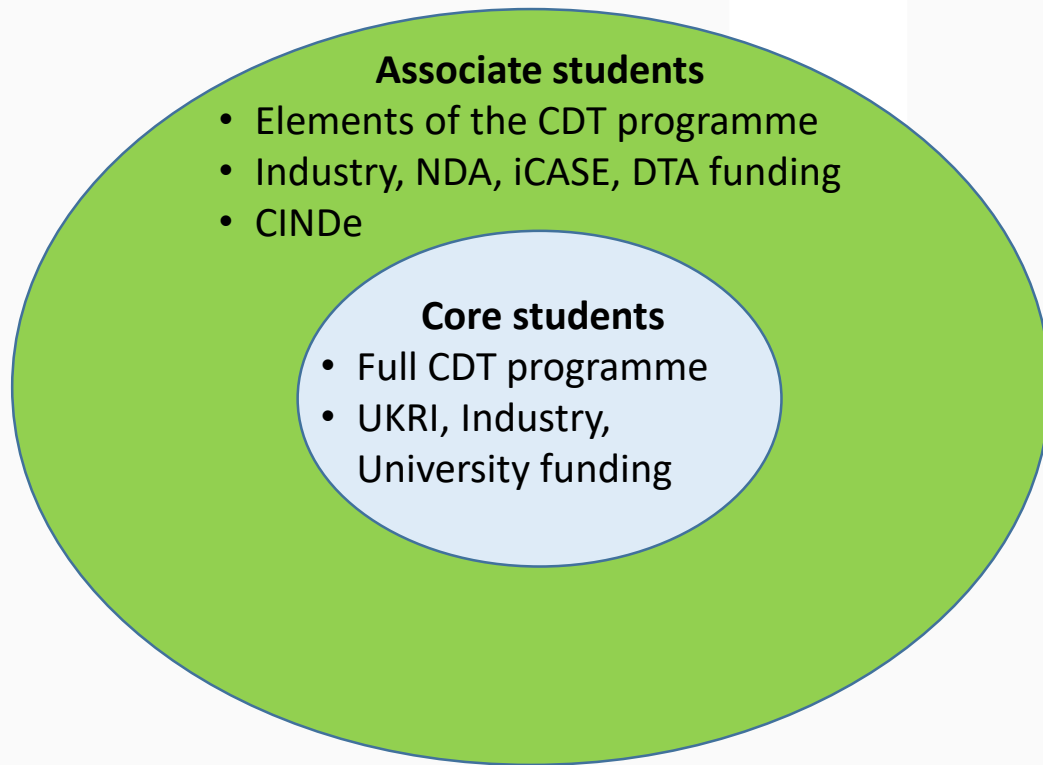
- GREEN Strategy via Industrial Advisory Board (IAB): Meetings of all HEI & non-HEI partners as required and annually at Winter School
- GREEN Management via GREEN Management Board (GMB): Meetings of 5 HEIs every 6 weeks by conference call and face-to-face every quarter
- Oversight of GREEN student experience: panel of 3 externals (B'Ham, Strathclyde, NNL)



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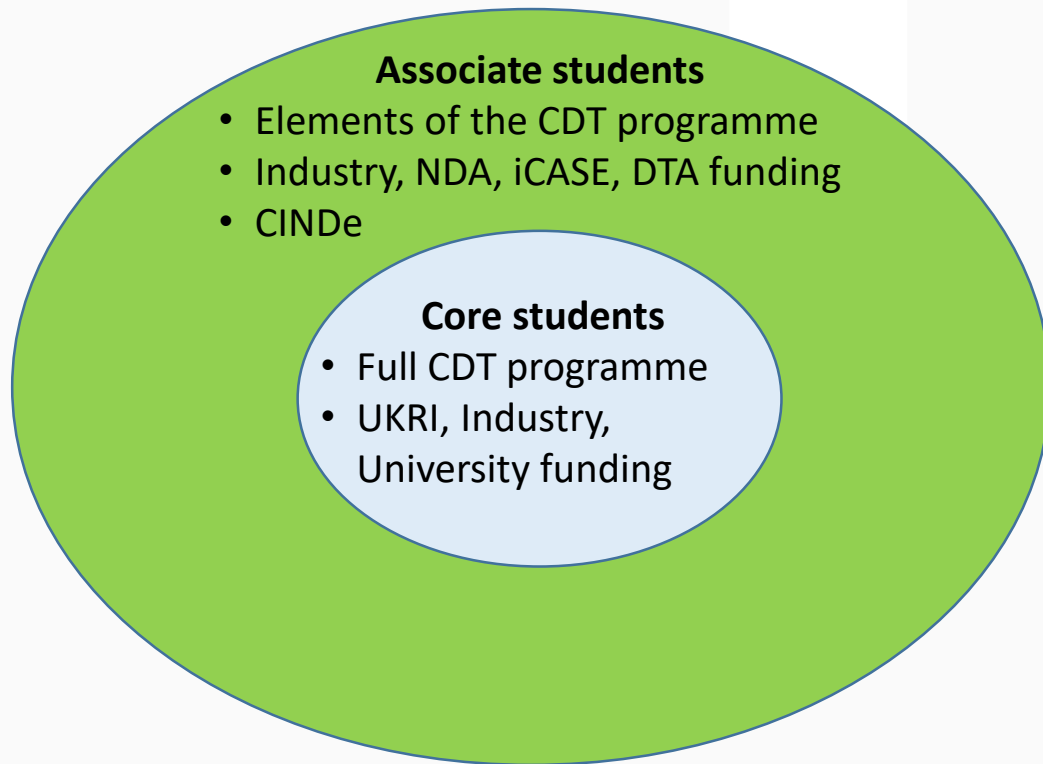
# Structure



## 4 Months Bespoke Taught Programme

- 12 week 'Introduction to Nuclear Energy'
- No specific nuclear background required
- Business Games, Exercises, Case Studies
- Strong 'real life' contribution
- Site visits – Sellafield, Springfields, Heysham
- **2022 – visit to Research Reactor, Taiwan**
- Public engagement training and events – MOSI, Jodrell Bank Bluedot, ScienceX at Trafford Centre, Schools
- Winter School – 3 day residential, >200 attendees, joint with Nuclear Energies Futures CDT

# Structure



## 6 Months Student Specific Training (SST)

- SST1 – Literature review and report
- SST2 - Project specific training and report
- Presentation and poster days
- End-of-year student conference

## 36 Months PhD Research

- Host HEI PGR QA system
- Co-supervision
- **EngD Route**
- Ongoing CPD and steps towards SQEP status
- Training - Responsible Research and Innovation; Risk awareness; International Nuclear Law; Careers



# Student numbers: Cohorts 1-3 – 51 FTE



Current Nuclear Programmes	• Spent Nuclear Fuel and Nuclear Materials Management	5
	• Decommissioning and Clean-Up	6
	• Geological Disposal	3
	• Current Operating Reactors	7
	• New Build Reactors	6
	• Nuclear Security	1
	<b>Total</b>	<b>28</b>
Future Nuclear Energy	• Fusion	6
	• Future Fuel Cycles	4
	• Advanced Reactors: Liquid Metal, Molten Salt, Gas Cooled	11
	• Co-generation	0
	<b>Total</b>	<b>21</b>
Nuclear Energy in a Wider Context	• Regulation	2
	• Manufacturing	1
	• Interaction of Infrastructure and Environment	2
	• Societal Issues including Economic & Finance	8
	• Management	3
	<b>Total</b>	<b>16</b>

# Progress – EDIA and COVID impacts



GENDER	Cohort 1 + 2
Male	7 + 12 (+4)
Female	6 + 8 (+6)
Non-binary	0 + 0
Transgender	0 + 0
Home/International	Cohort 1 + 2 (+3)
Home	10 + 19 (+8)
EU/International	3 + 1 (+2)
AGE	Cohort 1 + 2
21-24	5 + 15
25-29	4 + 3
30-39	2 + 2
40+	0 + 0

Cohort 1: Redesign of SST2; re-scope of PhD phase  
 Cohort 1: UKRI extensions, managed by home HEIs

Cohort 2: Taught programme on-line  
 Cohort 2: SST1 held remotely  
 Cohort 2: SST2 moving to (socially distanced) normal  
 Cohort 2: Poster session by Mozilla Hubs

Generally: CDT office operating remotely; Winter conference 2021 cancelled, 2 virtual sessions instead (joint with NEF). Future extensions TBD at later date



# Alumni and The Future



## Alumni

- 70% of Nuclear FIRST and NGN graduates in nuclear
- 90% in technical careers

## The Future

- Cohort 3 – induction and a return to normal delivery of taught course
- Cohort 4 – recruitment begins
- Taught course refresh – inclusion of fusion module?
- Taiwan and return of the Winter School
- Interim review



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