Royal Academy of Engineering | Policy Fellowships

Engineering better policy

Programme Annual Report 2024

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by Sir Chris Wormald KCB

Cabinet Secretary and Head of the Civil Service

Bridging the gap: Why policymakers must engage with engineering and science

The greatest challenge in policymaking today is not just having the right expertise but knowing where to find it and how to apply it effectively.

Too often, policymakers work in silos, believing they must solve complex problems alone. In reality, the best solutions come from reaching beyond government—engaging with experts in engineering, science, and other fields to bring new perspectives and problem-solving approaches into public policy.

Programmes like the Policy Fellowships are essential because they bridge that gap. They provide policymakers with access to engineers who understand systems thinking and can tackle the interconnected nature of today's policy challenges.

Whether it's decarbonising infrastructure, improving healthcare logistics, or understanding the unintended consequences of policy interventions, these are challenges that demand an engineering mindset.

As other countries have demonstrated, integrating engineering expertise into policy leads to smarter, more resilient decision-making. The UK must do the same. By embedding systems thinking and engineering-led problem-solving into policymaking, programmes like this can help ensure that public policy is not just well-intended but well-executed.

Sir Chris Wormald KCB

Foreword

by Dr David Cleevely CBE FREng

Chair of Policy Fellowships Working Group

The Royal Academy of Engineering's Policy Fellowships programme has tackled an extraordinary range of challenges since 2019, reinforcing the role of engineering thinking in policymaking.

In 2024, 14 Policy Fellows met 110 engineers across all disciplines in academia and industry. Together, they explored critical issues including the skills needed for the research and innovation workforce, governance frameworks for self-driving cars, national protection against illicit cyber proxies, low-cost nuclear energy, tackling child poverty in Scotland, energy security, and decarbonising transport.

A key strength of the programme is its ability to support a great diversity of long-term, recurring challenges—such as energy, net zero, transport infrastructure, child criminalisation, pandemic preparedness or public health.

This adaptability ensures that engineering insights remain at the forefront of complex decision-making.

Beyond individual projects, the programme continues to evolve. The Alumni Forum has the ambition to become a vital hub for knowledge exchange, ensuring the impact of Fellows Fellows extends well beyond their time in the programme. The annual Policy Fellowships Showcase has also become a key event, bringing together policymakers and engineers to share insights, highlight achievements, and demonstrate the practical application of engineering thinking in policy development.

Showcase 2024 reception: (from left to right) Policy Fellows David Martin, Abbie Badcock-Broe
(Image Credits Amanda Summons Creative)

Increasingly, we see engineering thinking being applied at regional and local levels, where policymakers are using these insights to drive tangible change. In Tower Hamlets, for example, Policy Fellows have applied systems thinking to tackle critical infrastructure and planning challenges, from securing sustainable heat networks to embedding circular economy principles into long-term water management. By engaging with experts through the Policy Fellowship, they have gained new perspectives, connected with key decision-makers, and implemented strategies that will shape the borough's future.

Looking ahead, evidence-led, interdisciplinary policymaking will be more important than ever. The Policy Fellowships programme has proven its value in embedding engineering approaches into government and beyond, helping to shape more effective, resilient policies.

I am delighted to introduce this year's annual report, which highlights the programme's continued success in bridging the gap between policy and engineering.

David Cleevely

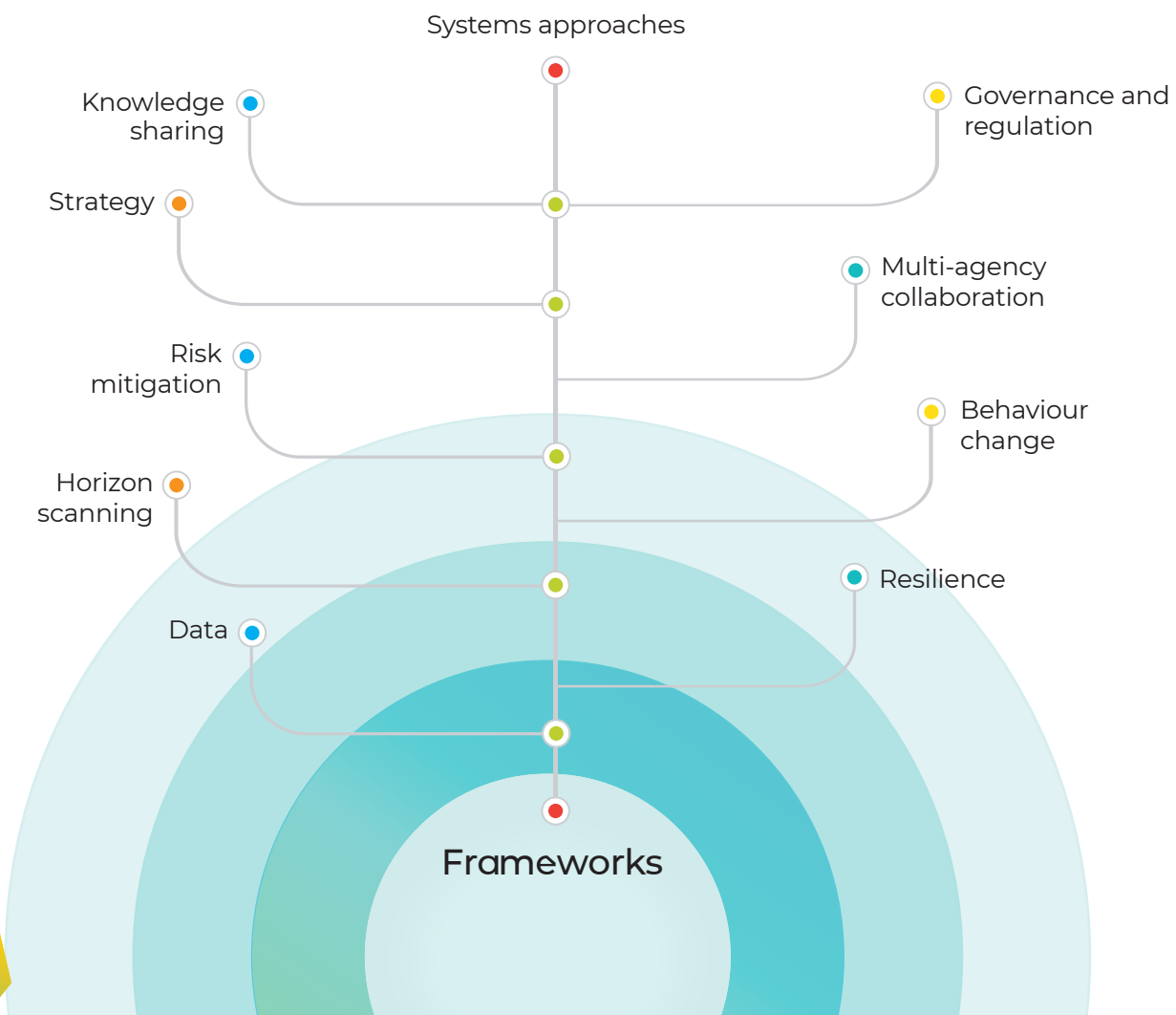
Showcase 2024 Panel (from left to right) Alex van Someren FREng, Chief Scientific Adviser for National Security; Policy Fellows Abbie Badcock-Broe, Sripriya Sudhakar, and Jo Reilly; Sir Chris Wormald KCB, Cabinet Secretary and Head of the Civil Service; and Nick Starkey, the Academy's Director of Policy and International.
(Image Credits Amanda Summons Creative)

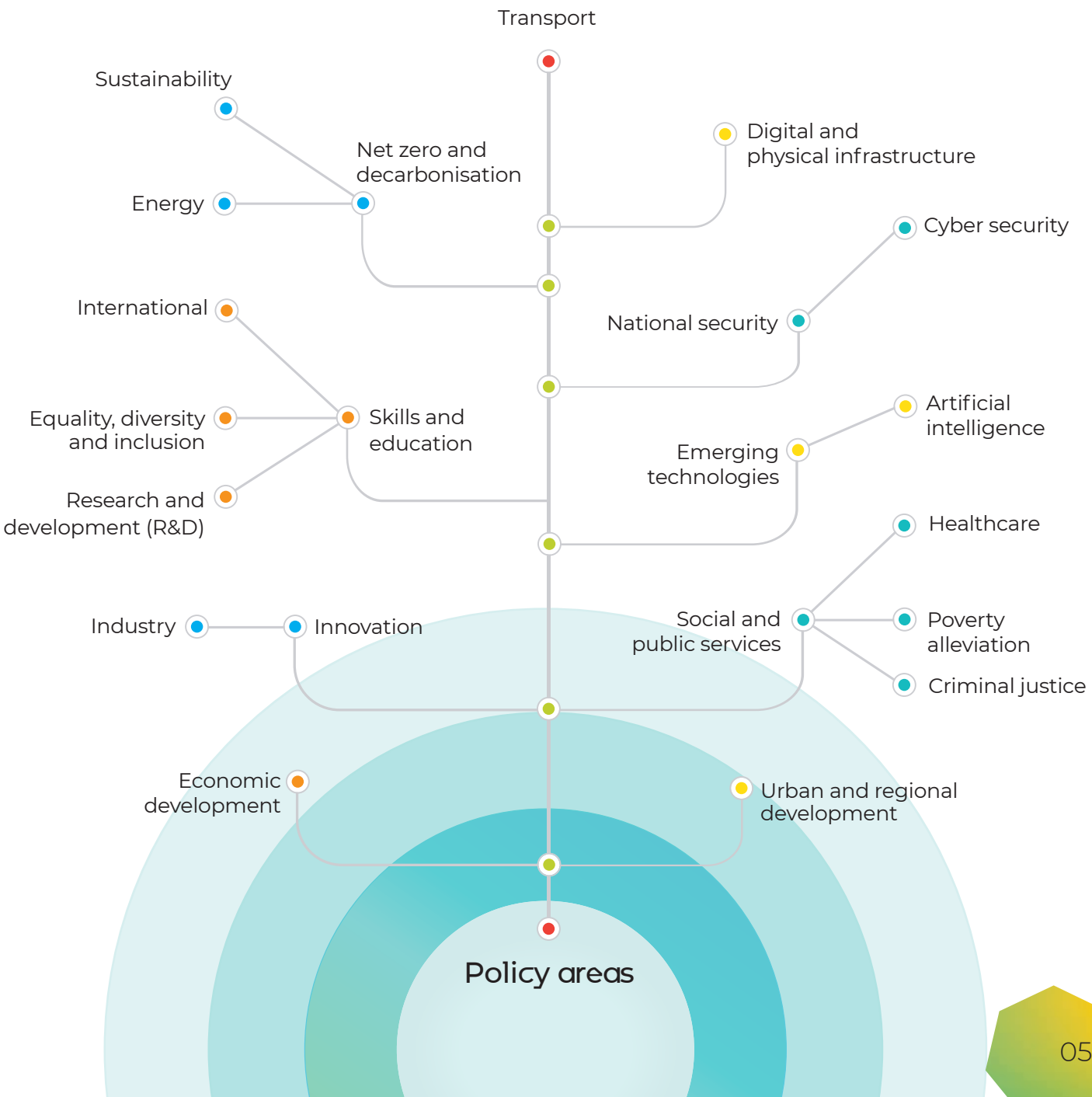
Engineering better policy: Tackling complex challenges across diverse sectors

The breadth of themes supported by the Policy Fellowships programme since 2019.

Since 2019, the Policy Fellowships programme programme has built a diverse community of **85 Policy Fellows**, each tackling some of the most pressing challenges in policy and engineering. This visual snapshot highlights the breadth of themes they have explored – from systems approaches and regulatory frameworks to emerging technology and decarbonisation.

This visual illustrates how the programme has supported knowledge exchange and policy innovation across multiple sectors. The engagement reflects not only the diversity of topics but also the real-world impact of the programme in shaping policy conversations.




Transport
Sustainability
Net zero and decarbonisation
Energy
Digital and physical infrastructure
Cyber security
International
National security
Equality, diversity and inclusion
Skills and education
Research and development (R&D)
Artificial intelligence
Emerging technologies
Healthcare
Industry
Innovation
Social and public services
Poverty alleviation
Criminal justice
Economic development
Urban and regional development
Policy areas

2024 Policy Fellows

Abbie Badcock-Broe
Head of Corporate, UK and Decarbonisation Strategy at National Grid Group

What are the strategic opportunities and threats that the future system operator should prepare for, to ensure that the UK energy system transitions to meet the UK's legally binding carbon budgets, while remaining resilient and affordable?

Kathryn Barnhill
Cyber Threat Coordination at the Home Office

How should the cyber security system approach the development of a practical policy framework that can effectively mitigate the illicit use of cyber proxies?

Gillian Cross
Head of the Place Based Social Justice Unit at Scottish government

How can the Scottish public sector develop national and local approaches that support person-centred, holistic methods of service delivery aimed at tackling child poverty?

Sophie George
Deputy Director, Sectors Policy, Office for Product Safety and Standards at the Department for Business and Trade

Post-pandemic, how can the partners that make up the health protection system work together most effectively at a local, regional and national level in a complex and changing health-threat environment to protect the nation's health?

Elena Gillies
Head of Automated Vehicles Act Implementation, Centre for Connected and Autonomous Vehicles at the Department for Transport

To deliver robust safety assurance for the new self-driving vehicle framework, what sort of detailed technical requirements should the Centre for Connected and Autonomous Vehicles develop in secondary legislation and guidance?

Will Gompertz
Innovation Lead, Low Cost Nuclear Challenge at Innovate UK - UKRI

What policy implications are there in operating nuclear facilities to provide heat to industrial sites for direct use in industrial processes (e.g., hydrogen production) and/or the production of secondary fuels?

Amy Harland
Deputy Director, Digital Transformation at Foreign, Commonwealth & Development Office (at the time of fellowship)

How do we ensure the innovation and technology organisations and groups working within and with the FCDO deliver on our toughest current tech challenges in a timely way, and that we are simultaneously preparing sufficiently for the tech challenges and opportunities of 5-10 years from now?

Dr Daire McCoy
Principal Economist at Ofgem (Directorate: Strategy, Economics, Research and Net Zero)

How can Ofgem take a systems-approach to evaluating the impact of our activities on consumers, regulated entities, and the wider energy system?

David Martin
Team Leader (Monitoring, Insights & International) – Energy Security Division at the UK Department for Energy Security and Net Zero

What are the main energy security opportunities and challenges as UK energy systems transition towards delivering net zero?

Jonathan Morris
Head of Future Energy and Water Systems at Infrastructure Planning Service

How can local authorities effectively contribute to and ensure the efficient and equitable delivery of decarbonised heat networks, considering their role, financial risks, and potential for maximising benefits for diverse socioeconomic groups, in light of the Energy Act 2023 and the existing challenges in the heat network market?

2024 Policy Fellows

Rupali Nahar-Williams
Head of Stakeholder Engagement, Data and Evidence for the Modern Slavery Unit at the Home Office

What approach should the Home Office take to developing a cross-sector prevention strategy addressing the evolving threat of modern slavery and human trafficking?

Dr Annette Pass
Deputy Director, Digital Transformation at the Foreign, Commonwealth and Development Office

How do we represent the journey to decarbonise transport, across all modes, to meet the dual objectives of net zero by 2050, while also limiting global warming to +1.5 degrees in the intervening period?

Dr Helen Terry
Strategy Lead, Talent and Skills at Investment Strategy, UK Research and Innovation

What are the most effective interventions (financial and policy) that UK research and innovation might take to up-skill and retrain the existing research and innovation workforce?

Gareth Tame
Expert Environmental Analyst at the Met Office

How can we establish forensic meteorology as a sustainable national capability?

Policy Fellows driving systems thinking knowledge sharing

A collaborative initiative with the Policy Profession Unit

The Policy Fellowships programme and the civil service's Policy Profession Unit have been collaborating on the 'Systems thinking knowledge sharing' series since 2022.

To date, 15 webinars have been delivered with a combined attendance of 3,373 civil servants. As we prepare for the 2025 series, the programme continues to provide a platform for policymakers to engage with engineering and systems-thinking approaches, helping them tackle complex policy challenges.

In 2024, the webinar series featured three impactful sessions led by two Policy Fellows, Cambyse Jafari-Pak and Jo Reilly, engaging a total of 1,158 civil servants.

- **Cambyse Jafari-Pak**, Deputy Director at the Department for Transport, led two sessions, one of which focused on the Seafarer Protections Nine-Point Plan, developed in response to the P&O Ferries incident in March 2022. This session explored creative approaches to strategic policy challenges, the government's role in global business and employment issues, and systems-thinking tools for policy design and implementation.
- **Jo Reilly**, former Head of the Serious Organised Crime Unit at HM Prison and Probation Service, led a session on tackling child criminal exploitation. She explored how policy interventions can trigger unintended consequences, why a systems approach is crucial to addressing root causes rather than just symptoms, and how tools like system mapping, horizon scanning, and anticipating system responses can lead to more effective solutions.

With its continued success and high engagement, the systems thinking knowledge sharing series will expand in 2025, reinforcing the role of engineering thinking in public policy development and providing policymakers with the tools to navigate complex challenges effectively.

For more information about the Policy Profession, please visit www.gov.uk/government/organisations/civil-service-policy-profession

(Image Credits
Amanda Summons Creative)

First Senior Policy Fellows

The Academy piloted a new Senior Policy Fellowships programme, connecting eight senior public servants with five leading engineers.

The pilot explored examples of how engineering-inspired systems approaches have been mobilised to progress complex interconnected challenges in major engineering projects, and how learning could be applied in policy and public service delivery work. The new programme will extend the benefits of the Policy Fellowships by further developing a network of senior public sector peers and engineering experts.

We are grateful to our first Senior Policy Fellows and leading engineers for their support:

Susan Acland-Hood
Permanent Secretary, Department for Education

Claire Dykta
Chief Strategy Officer, National Energy System Operator

Dame Tamara Finkelstein DCB
Permanent Secretary, Permanent Secretary, Department for Environment, Food and Rural Affairs

Abi Hayes
Strategy Director, Department for Transport

Alex Jones
Director General Research, Department for Science, Innovation and Technology (DSIT)

Emran Mian CB OBE
Director General for Digital, Technology and Telecoms, DSIT

Jonathan Mills CB
Director General for Energy Markets and Supply, Department for Energy, Security and Net Zero

Urvashi Parashar
Director of Analysis and Chief Economist, Department for Culture, Media and Sport

Damian Parmenter CBE
Director General for Strategy and Delivery, Ministry of Defence

Dame Dawn Childs DBE FREng
Chief Executive Officer at Pure Data Centres

Kuldeep Gharatya FREng
Technical Services Director at Transport for London

Mark Wild OBE FREng
Former Chief Executive Officer at Scotia Gas Networks

Dervilla Mitchell DBE FREng
Former Global Deputy Chair, Arup Group Ltd

Dr David Cleevely CBE FREng
Chair of the Policy Fellowships Working Group

Applying engineering thinking to shape the future of policy

Susan Acland-Hood

Permanent Secretary to the Department for Education and a member of the Policy Fellowships Working Group

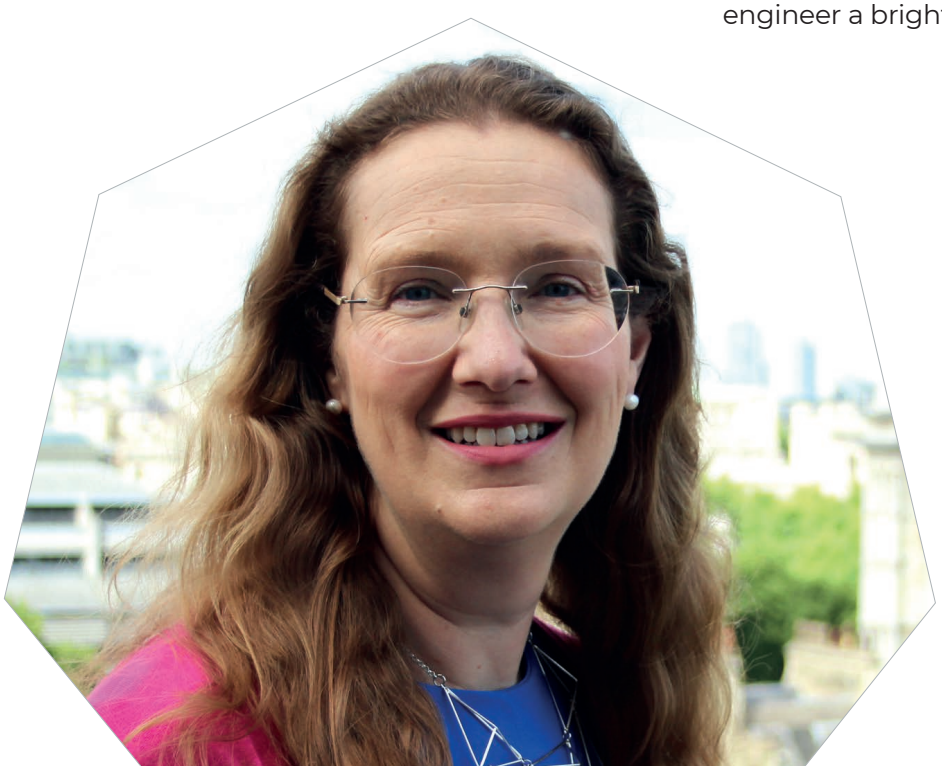
Engineering thinking is a powerful tool in policymaking, offering innovative solutions beyond traditional systems thinking.

By applying engineering principles to non-engineering problems, we can improve decision-making across various policy areas, ensuring more effective and robust solutions to problems.

As the Permanent Secretary to the Department for Education, I advocate for continuous learning and training, essential for successful government professionals.

The Policy Fellowships programme provides training and support to policymakers, equipping them with engineering-inspired methods for evidence-based and practical approaches to complex issues. As a working group member, I believe this programme can further empower policymakers, expand the use of engineering thinking in government, and drive impactful change.

By continuing to innovate and adapt, we can engineer a brighter future for our society.



Case study: How Policy Fellows are developing skills for tackling the energy transition

What specific skills will be needed to work across government departments to tackle the energy transition?

Five of the latest cohort of Policy Fellows describe how they are putting different skills, knowledge and connections to work to build systems that will secure the UK's net-zero future.

Identifying moveable levers with systems thinking

"There is simply not enough engineering thinking within the current public sector," says **Will Gompertz**, Innovation Lead – Low Cost Nuclear at Innovate UK. His policy challenge involved exploring how heat from nuclear reactors can be used to help decarbonise heavy industry and transportation fuels.

"Essentially, the fellowship itself helps identify what is within my zone of control, what's in my zone of influence, who has those levers within the system, and who needs to be approached," he says.

Those taking a systems-thinking approach can map out the factors that may be driving particular outcomes, making it possible to understand the factors that can be controlled.

This was an important consideration for **Daire McCoy**, Principal Economist at Ofgem, whose policy challenge involved working out the impacts of the energy regulator's policies.

Systems thinking is also important for predicting the long-term impact of any interventions being taken. "Every transition is going to create winners and losers," McCoy says. "Taking a systems-type approach to understanding problems early can help you identify some of the potential adverse consequences and impacts on certain people, and try to mitigate them."

Asking the right questions

The real value of systems thinking is that it helps policymakers find the people they need for help solving their problem, Gompertz says. The Royal Academy of Engineering's Policy Fellowships programme connects policymakers and systems thinkers with field experts to help them create better public services and tackle the hardest problems.

At the start of their fellowship, Policy Fellows have conversations, or "one-to-ones" with about a dozen experts from a diverse range of fields to discuss their individual problems, and possible approaches to solving them.

Annette Pass is Deputy Chief Scientific Advisor – Science Innovation and Technology at the Department for Transport. Her policy challenge involved working out how to decarbonise UK transport by viewing the sector as a holistic system.

In her one-to-ones, Pass spoke with engineers, entrepreneurs and academics as well as those from a social sciences background. Such a diversity of knowledge can provide a new perspective on the challenges at hand. "[They could see] linkages outside of those very detailed areas and into the kind of wider transport, energy system as a whole," says Pass. "That zoomed-out perspective... was a super helpful part of the Policy Fellowship."

Having regular conversations with those who have done similar work themselves also has its benefits. "It was really great to get that input, and to talk to people who had driven change in complex organisations, and for them to talk through their experiences," McCoy says.

David Martin, who led a Strategic Projects and Forecasting team at the Department for Energy Security and Net Zero during his Policy Fellowship challenge, adds: "Learning about engineering perspectives from people who are actually engineers, who have managed electricity systems or managed a power station or built things is one of the unique advantages of this programme."

Translating expert insights into lasting change

One basic, but important, skill for policymakers involved in delivering the energy transition, or solving any social problem, is the ability to communicate across, and to integrate information from, different disciplines, Martin says. "The social scientists need to learn to talk to the engineers, commercial people need to learn to talk to communications experts, and so on," he adds.

"Systems thinking is about the art of relationships," says Gompertz. "Having engineers within the public sector who can reiterate what the engineers outside the public sector are saying is how things change."

A lot of the problems that we face require coordination across multiple domains and organisations, says McCoy. "The fellowship is very useful for breaking down some of those silos."

Policy Fellows meet at regular in-person follow-up sessions to share their insights and progress on their particular challenges.

These sessions also offer opportunities to expand their network – **Abbie Badcock-Broe**, Head of Corporate, UK and Decarbonisation Strategy at the National Grid, is working on a trial project with a meteorologist from the Met Office, whom she met at one of the sessions.

"Although at the moment, my current work has been very internally focused, lots of other external people are getting in touch with me, more so because of the relationships I've built through the policy programme," she says.

"This is so important when you're doing an internal strategy role, where you can become quite blinkered. You need to keep joining the dots with the external environment and external world and people."

Case Study: How Policy Fellows are creating lasting change in London's busiest borough

Why local government needs systems thinking

The London Borough of Tower Hamlets is the most densely populated area in England, with about 112 people living on each football-pitch-sized area of land.

With its rapidly increasing population, high housing targets, and rapidly transforming landscape, Tower Hamlets presents unique infrastructure challenges.

How have Policy Fellows **Matt Pullen**, **Sripriya Sudhakar** and **Jonathan Morris** applied systems thinking to help secure a sustainable future for the borough?

Better understanding stakeholders and service providers

Jonathan Morris is Head of Future Energy and Water Systems at Tower Hamlets. His policy challenge involves working out how to facilitate the delivery of decarbonised heat networks in the borough in a way that benefits all socioeconomic groups and contributes towards a just energy transition.

Tower Hamlets has a mixture of housing stock, including Victorian buildings, mid-20th century housing estates and more modern apartment buildings. Privately owned, or mixed tenure newer buildings can be more attractive to heat network providers than older social housing blocks because they often require less retrofitting so can be easier and cheaper to work with, Morris explains.

> **"Getting into the head of the heat network provider is something I've learned that needs to be done right up front "**

Without public sector intervention, this could leave older social housing behind, restricting access to cheaper, decarbonised heat for those who need it most," he warns.

Morris's conversations with field experts led him to 'step into the shoes' of heat network providers to better understand their needs and make the borough's social housing more attractive to them.

One of the Fellows asked what the council can do in advance to de-risk the prospect of doing business in Tower Hamlets, while another suggested taking the guesswork out completely by engaging with heat network providers directly to understand what they'd like to see councils do in the area. "Getting into the head of the heat network provider is something I've learned that needs to be done right up front," Morris says.

For **Matt Pullen**, Head of Infrastructure Planning at Tower Hamlets, being a Policy Fellow has "demystified" federal government and civil service. "I have such a better understanding of how the civil service works now," he says. "That's of massive value... because we have to work with them, especially on net zero."

He continues: "There'll be so many times where we'll to need to apply to the civil service for funding and support around regulations, these kinds of things, and understanding how they work, and how to work with them effectively, is vital."

Building resilient systems for change

Pullen's policy challenge involved developing non-technical solutions that will deliver water to the borough in the years ahead. The programme helped him acknowledge that traditional, linear processes of solving complex problems in complex systems would be "completely insufficient".

He says the borough has started to embed systems thinking within its service to make it more resilient and workable in the long term.

"We worked with the systems coach to look at our circular economy and embodied carbon work to understand how the wider systems of play work there," he says. "We used that to identify five key work streams where we think the council can be most effective in delivering meaningful change." His team plans to deliver against those five work streams this year.

His conversations with field experts helped him understand stakeholders' points of view: "They introduced really useful tools to understand stakeholder views and how you come together, that even if you can't reach consensus, can you find some red lines so that you can at least reach tolerance?"

Making the right connections

Sripriya Sudhakar is Director of Planning and Building Control at Tower Hamlets. Sudhakar says that a systems-thinking approach helped her tackle her policy challenge by reframing the problem at hand (see Showcase round-up).
Through her one-to-ones, she found that her challenge of making the undeveloped area under the DLR usable, which initially appeared to be an engineering problem, was actually a social problem in disguise.

Some of the experts she spoke to were able to draw parallels with their experience of infrastructure, while one introduced her to the very person she needed to set her vision for change in motion – the Deputy Commissioner of Transport for London.

"It's a very beautiful journey in terms of how and where we started and how those links and connections helped us," she says.

Due to his connections in the fellowship programme, Morris has been invited to two launch events at the Houses of Parliament in the last six months. "Being exposed to people that have a lot to offer in [helping me] deal with my policy challenge [is something] that I simply would not have had access to in my day to day," he says.

The networking continues at regular events for Policy Fellows, which help keep programme members in touch. "I tend to try and stay quite engaged with the programme," says Pullen.

"It is very rare that I leave [an Academy or Policy Fellowships event] without something that's going to impact on and improve the work I do," he says, "because there's such a fascinating, diverse group of people that you always come into contact with."

What have they learned?

"That others now see me as an expert, and I'm still learning!"

Abbie Badcock-Broe

Abbie is Head of Corporate, UK and Decarbonisation Strategy at the National Grid

Her policy challenge involved identifying the strategic opportunities and risks that the National Energy System Operator (her then employer) should prepare for to create a robust long-term corporate strategy to meet its net zero operability targets. What has she learned since becoming a Policy Fellow? "That others now see me as an expert, and I'm still learning!"

"Just how important it is that we get more engineers into the public sphere."

Will Gompertz

Will is Innovation Lead – Low Cost Nuclear at Innovate UK

His policy challenge involved exploring how nuclear can be used to support the decarbonisation of heavy industry and transportation fuels. What has he learned since becoming a Policy Fellow? "Just how important it is that we get more engineers into the public sphere."

"The breadth of perspectives I got through this Policy Fellowship has refreshed my thinking on these problems."

David Martin

David Martin currently works on future nuclear power at the Department for Energy Security and Net Zero

His policy challenge involved developing understanding about potential solutions to achieving energy security in the road to net zero energy transition. "The breadth of perspectives I got through this Policy Fellowship has refreshed my thinking on these problems."

"[The Policy Fellowship has] opened up many potential avenues for me... the cohort of people we worked with were brilliant and just made wonderful colleagues and friends."

Daire McCoy

Daire is Principal Economist at Ofgem

His policy challenge involved developing an evaluation strategy to help the company understand the impact of its policies, and the extent to which they'd made change. "[The Policy Fellowship has] opened up many potential avenues for me... the cohort of people we worked with were brilliant and just made wonderful colleagues and friends."

"Having this experience of thinking and working things through with experts beyond your day-to-day job gives you that much more confidence when you're going back into the workplace."

Annette Pass

Annette is Deputy Chief Scientific Advisor – Science Innovation and Technology, at the Department of Transport

Her policy challenge involved decarbonising UK transport by viewing it as a holistic system. "Having this experience of thinking and working things through with experts beyond your day-to-day job gives you that much more confidence when you're going back into the workplace."

"I have a far more in-depth understanding of what systems thinking actually is, and how it can help us deliver our outcomes priorities in utility systems where delivery is often outside of the council's control."

Jonathan Morris

Jonathan is Head of Future Energy and Water Systems at the London Borough of Tower Hamlets

His policy challenge involved working out the most effective approach to delivering decarbonised heat networks in Tower Hamlets while maximising benefits for all socioeconomic groups and contributing towards a just energy transition.

"There are complex challenges within local government that we could get much better at delivering if we embrace these kinds of [systems thinking] approaches."

Matt Pullen

Matt is Head of Infrastructure Planning at the London Borough of Tower Hamlets

His policy challenge involved working out the non-technical solutions needed to deliver water systems to meet future needs. "There are complex challenges within local government that we could get much better at delivering if we embrace these kinds of [systems thinking] approaches."

"Being able to communicate with the TfL commissioner and how to bring them along [with the policy challenge]... [was a direct] outcome of the Policy Fellowship programme."

Sripriya Sudhakar

Sripriya is Director of Planning and Building Control at the London Borough of Tower Hamlets

Her policy challenge involved exploring how to make spaces under the DLR more usable. "Being able to communicate with the TfL commissioner and how to bring them along [with the policy challenge]... [was a direct] outcome of the Policy Fellowship programme."

Where are they now?

Ragne Low

Deputy Director in the Scottish government's Offshore Wind Directorate

Ragne Low became a Policy Fellow in 2020. How has her involvement with the programme had an impact on her work?

Since 2019, Ragne Low has had a front seat in Scotland's energy policy. When she first became a Policy Fellow, she was working on heat decarbonisation policies for the Scottish government. Until last year, she was a deputy director in the Scottish government's Directorate for Energy and Climate Change.

Now she's working on offshore wind, where she leads a team working to maximise the benefits of offshore renewable energy for the people, economy and environment of Scotland. Nearly five years after becoming a Policy Fellow, does systems thinking still play a role in her work?

When it comes to scenario planning, yes. "In the case of offshore wind, and the deployment of offshore wind at a particular time, at a particular scale of gigawatts, [we have to understand]: what's the implication across the wider energy system and for the supply chain?" she says.

Policy that maximises benefits

It's also crucial to think about who policy will affect. Low's work includes policy development on how communities can benefit from offshore wind. She is also working closely with a broad range of stakeholders on wider offshore wind policy.
She says that she has been using systems thinking - and in particular the insights from the systems component of the Policy Fellowship - in a more "direct sense" when thinking about collaboration across this diverse stakeholder landscape.

"[One Fellow] was very clear about [this] when we were in the fellowship," she says, "understanding stakeholders' interests and 'what they want out of the system', the leverage and influence they have, and how that all works together."

She continues: "We have to design policy and regulation that supports an effective market, but critically also to ensure that... we derive the greatest benefit for the Scottish economy and for the people of Scotland."

When we last spoke to Low in 2023, she observed that systems thinking could be a bit "Marmite" in the public sector. Are attitudes towards it changing?

"There is a move in the right direction on that," she says. "There are better networks, learning and development opportunities, and definitely a very strong emphasis on it from senior colleagues, and stakeholders, in terms of understanding things from a systems perspective."

> **The fellowship is having a longer-term impact on ways of thinking, particularly ways of collaborating."**

In the pipeline

This year, Low hopes to work with the Academy to explore how different organisations and teams can be positioned to deploy resources in such a way to deliver the best outcomes. She says the Policy Fellowship has opened her mind to different ways of thinking. "It's incredibly valuable," she says.

Nearly five years on, the programme continues to have an impact on her work: "It has a really long tail - in a positive way!" she says. "[It's having] a longer-term impact on ways of thinking, particularly ways of collaborating.

"I would absolutely encourage people to do it for that longer term purpose, as well as the short-term insight that you get on the policy problem."

Highlights from the 2024 Showcase: Engineering solutions in action

Engineering better public services

At the Policy Fellows Showcase last autumn, three Royal Academy of Engineering Policy Fellows shared their experiences since joining the programme, including how it helped them tackle their policy challenges and how they're making a difference in their sectors.

Identifying effective responses to complex challenges

Jo Reilly, former Criminal Justice Evidence and Change Lead for the Youth Endowment Fund, was taking a secondment at the organisation when she learned of the Policy Fellowships programme. Through the course of her one-to-ones with other Policy Fellows, she started to understand the different questions she needed to tease out of her original policy challenge question, which she said had been masking a lot of complexity. "Through all of those conversations, I started pulling out questions which I have a much better chance of answering," she said.

With this in mind, she also started thinking about designing an effective response. "It went from something ungraspable to something I can absolutely make a plan to think about and work on," she added. "The Youth Endowment Fund has been really grateful for that and is taking it quite seriously."

"[My policy challenge] went from something ungraspable to something I can absolutely make a plan to think about and work on."

Jo Reilly

Transforming an engineering problem into a vision

Sripriya Sudhakar, Director of Planning and Building Control for the London Borough of Tower Hamlets, was one of the first Policy Fellows. She was exploring how to make the 7.2 hectares of sterile land under the DLR more useable, which became her policy challenge.

"We had fantastic interview opportunities with Academy Fellows," Sudhakar said. The programme put her in touch with the right people – including one involved with the DLR who would introduce her to the deputy commissioner of Transport for London.

"Those conversations were really eye-opening," she said. "The Academy Fellows helped me to see my problem not just as a very technical engineering bit, but really a social and human problem."

This ultimately helped her realise a trial run of her vision for the spaces under the DLR. In 2022, Londoners enjoyed a three-day event under the arches of the DLR, Adventure of the Underline, including circus performances, street art workshops, live music, and more.

The event showcased the potential of these spaces and the role they could play in the borough's communities, as well as providing a playbook for other boroughs looking to benefit from their unused spaces in similar ways.

The programme left Sudhakar with an appreciation of how many policies and projects may be lying unexplored, just because they're being seen as purely engineering problems.

"There may be so many other [projects] that could help unlock so much growth that we would like to see, but we're simply not dealing with it because we think it's too complex," she says.

"The programme helped me to see my problem not just as a very technical engineering bit, but really a social and human problem."

Sripriya Sudhakar

Embracing a bolder, more courageous mindset

Abbie Badcock-Broe, Head of Corporate, UK & Decarbonisation Strategy at the National Grid, needed to identify the strategic opportunities and risks for the National Energy System Operator (her then employer), a new independent organisation that manages and operates the UK's energy in real time.

She said she used the programme to help her "do the homework" that would inform how to prepare for the operator's launch. "The quality of the interactions was amazing," she said at the showcase. ["It was a] fantastic avenue to get some of that outside-in perspective, which is not really afforded to a lot of organisations... to think a bit more holistically."

She continued: "We need to understand everybody's boundaries, and the interconnections between us as we go after unlocking how to address some of the biggest challenges that our generations have ever faced."

Along with this perspective, she received practical guidance from the Policy Fellows about how to integrate strategy into an organisation that is undergoing transformation.

Her conversations also foregrounded the need for a change in mindset when it comes to risk and perfectionism.

"The resounding messages I had coming back time and time again from the prestigious Fellows... is that for... a whole systems energy planning perspective, the organisation had to be bold, think very differently and have a courage[ous] mindset about how we go tackling the decarbonisation and energy trilemma challenge."

She noted one insight that had stuck with her since her one-to-ones: perfection is the enemy of progress. "We have to take risks. We have to progress. We have to embrace the failure that we know is going to happen," she said.

"Perfection would be great if we had all the perfect plans, but even coming at a problem slightly differently and thinking holistically is progress."

> **"Perfection would be great if we had all the perfect plans, but even coming at a problem slightly differently and thinking holistically is progress."**
> **Abbie Badcock-Broe**

"As Chief Scientific Adviser for National Security, I see first-hand how rapidly evolving technologies impact policy decisions. The Showcase event was a great opportunity to discuss how engineering and technical expertise can help policymakers navigate complex challenges, from digital resilience to emerging security threats.

Engaging directly with policymakers through the Policy Fellowship programme allows us to bridge the gap between technical innovation and policy, ensuring that decisions are informed by the latest developments in engineering and science. This kind of collaboration is essential for building robust, forward-thinking policies that effectively address national and global challenges."

Alex van Someren FREng

computing entrepreneur, venture capitalist, and Chief Scientific Adviser for National Security

"This was an incredibly interesting and useful event. Talking to people from a range of departments and professional backgrounds about their very different but equally complex policy challenges made clear the benefits of systems thinking methodologies when dealing with complexity. I learned a lot as well as having a great evening."

Jo Reilly

former Criminal Justice Evidence and Change Lead, Youth Endowment Fund, and a Policy Fellowships Working Group member

Engineers and experts involved in 2024

We thank all engineers and experts who generously contributed to the success of the programme this year by engaging with and supporting our Policy Fellows.

Professor Sir Bashir M. Al-Hashimi CBE FREng FRS
Vice President (Research & Innovation), King's College London

Mark Apsey MBE
President, Institution of Chemical Engineers

Professor Dame Helen Atkinson DBE DL FREng
Pro-Vice Chancellor and Head of School of Aerospace, Transport Systems and Manufacturing, Cranfield University

Professor Erkko Tapio Autio FBA
Chair in Technology Venturing and Entrepreneurship, Imperial College London Business School

Jonathan Baggs FREng
Head of Nuclear, Abbott Risk Consulting

Dr George Balston
Programme Co-Director, Defence and Security, The Alan Turing Institute

Professor James Barlow
Co-Director of Imperial's Centre for Sectoral Economic Performance, Imperial College London

Dr John Beckford
Partner, Beckford Consulting, and Visiting Professor in the Department of Civil, Environmental and Geomatic Engineering, University College London

Professor Mark Birkin
Professor of Spatial Analysis and Policy in the School of Geography, University of Leeds

Professor Robin Bloomfield FREng
Founding Partner, Adelard LLP, and Professor of System and Software Dependability, City, University of London

Professor Phil Blythe CBE FREng
Director DARe National Hub for Decarbonised, Adaptable and Resilient Transport Infrastructures and Professor of Intelligent Transport Systems, Newcastle University

Professor David Bogle FREng
Head of Doctoral School and Professor of Chemical Engineering, University College London

Baroness Brown of Cambridge DBE FREng FRS FMedSCI
Engineer and crossbench member of the House of Lords

Dr Yang Cao
Assistant Professor, Laboratory of Foundations of Computer Science, University of Edinburgh

Tim Chapman FREng
Partner and Director, Boston Consulting Group, and Visiting Professor, Imperial College London

Professor Joanna Chataway
Professor of Science and Technology Policy, University College London

Professor Jordan Cheer
BAE Systems/Royal Academy of Engineering Research Chair in Smart Acoustic Control Technologies, and Professor, Institute of Sound and Vibration Research, University of Southampton

Mandy Chessell CBE FREng
Computer scientist and Founder, Pragmatic Data Research UK

Dame Dawn Childs DBE FREng
CEO, Pure Data Centres Group

Professor Anthony Cohn FREng
Professor of Automated Reasoning, University of Leeds; and Foundational Models Theme Lead, Alan Turing Institute

Emeritus Professor Brian Collins CB FREng
Professor of Engineering Policy, University College London

Ian Constance
CEO, Advanced Propulsion Centre

Dr Mike Cook FREng
Adjunct Professor, Imperial College London

Dr Adam Cooper
Associate Professor in Engineering Policy, University College London

Joan Cordiner FREng
The Head of the School of Chemical, Materials and Biological Engineering, Sheffield University

Danielle Croucher
Policy and Public Affairs Specialist, Leads Skills and Talent Policy, National Centre for Universities and Business

Professor Gyuchan Thomas Jun

Professor of Sociotechnical, System Design
Loughborough University

Background

Professor Jun has over 20 years' experience applying systems thinking to complex incident investigation, quality and safety improvement and AI-based system innovation in healthcare. He is an award-winning animation and film producer who highlighted the importance of systems thinking.

"This programme offers unique opportunities for mutual learning for everyone involved. It was a real privilege to hear about complex challenges my Policy Fellow faces in addressing child poverty and support them. The expert group's calibre and experience are exceptional and listening to their advice to other Policy Fellows was a valuable learning experience."

Engineers and experts involved in 2024

Professor Jon Crowcroft FREng
Marconi Professor of Communications Systems, University of Cambridge

Dame Jo Da Silva DBE FREng
Global Sustainable Development Leader, Arup Group Ltd

Peter Dearman FREng
Senior Visiting Lecturer, Sheffield Hallam University

Professor Lianne Deeming FREng
CEO, BlueLight Commercial

Professor Dave Delpy CBE FREng FRS FMedSci
Emeritus Professor of Medical Photonics, University College London

Dr C J Elliott MBE FREng
System Engineer and Barrister, Director, Léman Micro Devices SA

Mark Enzer OBE FREng
Strategic Advisor, Mott MacDonald; and Visiting Professor, University of Cambridge and Imperial College London

Steve Featherstone FREng
Managing Director, Sachle Consultants Ltd; and Chair, Fish Plate Joint Alliance

Professor Ewan Ferlie FBA
Professor of Public Services Management and previous Head of Public Services Management & Organisation Group, King's College London

Professor Sir Anthony Finkelstein CBE FREng
President, City, University of London

Emeritus Professor David Fisk CB FREng
Professor, Systems Engineering and Innovation, Imperial College London

Dr Shaun Fitzgerald OBE FREng
Visiting Professor, Department of Engineering, University of Cambridge, and Director, Centre for Climate Repair, University of Cambridge

Robert Friel
Consultant, Apteno Consulting

Sir Peter Gershon CBE FREng
Chair, Dreadnought Submarine Alliance; and Chair, Join Dementia Research

Professor Nigel Gilbert CBE FREng
Director, Centre for Research in Social Simulation, and Professor of Sociology, University of Surrey

Professor Shaogang Gong FREng
Professor of Visual Computation, Queen Mary University of London

Professor Muki Haklay
Professor of Geographical Information Science, University College London

Professor Dame Wendy Hall DBE FREng FRS
Regius Professor of Computer Science, University of Southampton

Professor Jim Hall FREng
Professor of Climate and Environmental Risks, University of Oxford

Christopher Hamlin FREng
Co-Founder and Lead Advisor, HancockHamlin Ltd

Dr Simon Harrison FREng
Group Head of Strategy, Mott MacDonald

Dr Gareth Headdock
Chief Science and Technology Officer, National Nuclear Laboratory

Professor Cameron Hepburn FREng
Battcock Professor of Environmental Economics, University of Oxford, and Director, Smith School of Enterprise and Environment

Professor Dame Karen Holford DBE FREng
Chief Executive and Vice-Chancellor, Cranfield University, and Chair, Midlands Innovation Board, and Director, Oxford-Cambridge Supercluster Board

Dr Michael Humann
Course Coordinator and Training Facilitator, University of Liverpool

Dame Sue Ion FREng FRS
Honorary President, National Skills Academy for Nuclear

Professor Dr Gyuchan Thomas Jun
Professor of Sociotechnical System Design, Loughborough University

Professor Roger Kemp MBE FREng
Professor Emeritus, Lancaster University

Professor Nigel Gilbert, CBE FREng FRSA

Professor of Computation Social Science, University of Surrey

Background

Nigel Gilbert was one of the first to use agent-based models in the social sciences in the early 1990s, and has since published widely on the methodology underlying computer modelling. He has also published on the application of simulation, system dynamics and artificial intelligence for applied and policy-related problems such as understanding commercial innovation, managing environmental resources such as energy and water, and supporting public policy decision-making.

“It is an exhilarating experience to talk with Policy Fellows, not knowing what will come up in conversation, although it is always something interesting, challenging, and an opportunity to apply system-thinking ideas to a fascinating range of important policy issues. **The Academy does a brilliant job in connecting me with such a broad group of policy people**.”

Engineers and experts involved in 2024

Professor Duncan Kemp
Senior Fellow for Systems Engineering in Defence Equipment and Support, UK Ministry of Defence

Professor Siddartha Khastgir
Head of Safe Autonomy at WMG, University of Warwick

Caroline Knowles
Global Professorial Fellow, Queen Mary University of London

Dr Simon Kolstoe
Associate Professor in Bioethics, University of Portsmouth

Dr Remi Lam
Staff Research Scientist, Google DeepMind

Dr Joanne Leach
Research Fellow, Department of Civil Engineering, University of Birmingham

John Leggate CBE FREng
Chair, WizeCap Advisors

Petrus Lindeque FREng
Chief Engineer, Nationwide Building Society

Baroness Lister of Burtersett CBE
Professor of Social Policy, Loughborough University

Professor Alessio Lomuscio
Professor of Safe Artificial Intelligence, Imperial College London; CTO, Safe Intelligence

Francesca Long
Head of Training and Talent Development, Faraday Institution

Professor John Loughhead CB OBE FREng
Industrial Professor of Clean Energy, University of Birmingham

Dr Ian Mabbett
Enterprise, Partnerships and Innovation Lead, the Faculty of Science and Engineering, Swansea University

John MacArthur FREng
Director, Highland Sustainability

Professor Derek McAuley FREng
Emeritus Professor of Digital Economy, University of Nottingham

Dr Kerry Mashford OBE
Non-Executive Chair, Trust Electric Heating

Dr Kristen MacAskill
Associate Professor in Engineering, Environment and Sustainable Development, University of Cambridge

Dr Catherine McClay OBE FREng
Managing Director, National Grid Distribution System Operator

Professor John McDermid OBE FREng
Director, McDermid Associates Ltd; Professor of Software Engineering, University of York; and Director, Assuring Autonomy International Programme, Lloyd's Register Foundation

Dame Dervilla Mitchell DBE FREng
Director, Arup Group

Andy Mitchell FREng
CEO, Thames Tideway Tunnel

Professor Alex Mold
Professor of Public Health History,
London School of Hygiene & Tropical Medicine

Professor Paul Newman CBE FREng
Director, Oxford Robotics Institute, and BP Professor of Information Engineering and Fellow of Keble College, University of Oxford; and Founder, Oxbotica Ltd

Jim O'Sullivan FREng
Chief Executive, Highways England Ltd

Rashik Parmar MBE
Group Chief Executive, BCS, The Chartered Institute for IT

Reema Patel
Director of Research and Implementation, Iswe Foundation

Dr Yoge Patel FREng
Chief Executive Officer, Blue Bear Systems Research Limited

Andrew Pemberton
President, International Council on Systems Engineering UK Chapter

Professor Honor Powrie FREng
Senior Director, General Electric Aerospace

Professor Fiona Rayment OBE FREng

Nuclear Advisor and Non-Executive Director

Background

Professor Fiona Rayment enjoys a plural career as a nuclear advisor and non-executive director. She is internationally renowned for engineering leadership, pioneering innovation and technical expertise across the global nuclear sector. Fiona's engineering insight, established through decades of providing technical and engineering support to operating nuclear facilities, is particularly valued by international research communities, governments and commercial organisations alike.

"The Royal Academy of Engineering Policy Fellowships **provide a unique offering by linking experts in policy creation with experts in specific areas of engineering.** It is a privilege to engage with the Academy through the Policy Fellowships programme and assist in some small part with the innovations being considered for areas such as energy, security and critical infrastructure."

Engineers and experts involved in 2024

Dr Fiona Rayment OBE FREng
Nuclear Advisor and Non-Executive Director

Matthew Rooney
Head of Policy, Institution of Mechanical Engineers

Andrew Rutter FREng
Director and Owner, Rutter Design

Professor Sarah Sharples FREng
Chief Scientific Adviser, Department of Transport; and Professor of Human Factors, Faculty of Engineering, University of Nottingham

Dr Mike Short CBE FREng
Chair, UK Telecomms Labs and UK Telecommunications Innovation Network Advisory Board; and former Chief Scientific Adviser, Department for Business and Trade (DBT)

Professor Elizabeth Shove
Professor of Sociology, Lancaster University

Phil Smith CBE FREng
Chair, Skills England

Professor Gaven Smith CB FREng
Professor of Cyber Security, University of Manchester; Non-Executive Director, Technology Advisor; and former Director General for Technology, GCHQ

Gavin Starks
Founder and CEO, Icebreaker One; and Co-Chair, Smart Data Council, Department for Business and Trade

Dr Jack Stilgoe
Professor of Science and Technology Studies, University College London

Jack Stockdale OBE FREng
Chief Technology Officer, Darktrace

Professor Rahim Tafazolli CBE FREng
Regius Professor of Electronic Engineering, and Founder/Director of 5G Innovation Centre, University of Surrey

Professor Lord Tarassenko CBE FREng FMedSci
Founding President, Reuben College, and former Head of the Department of Engineering Science, University of Oxford

Paul Taylor CBE FREng
Director, Morgan Stanley International PLC

Professor Philip Charles Taylor FREng
Vice-Chancellor and President, University of Bath

Dr Peter Thompson CBE FREng
CEO, National Physical Laboratory, NED, HVMC, and Visiting Professor, University of Surrey

Professor Jacopo Torriti
Professor of Energy Economics and Policy, University of Reading

Professor Nick Tyler CBE FREng
Chadwick Chair of Civil Engineering, University College London

Professor Liz Varga CBE
Professor of Complex Systems, Head of the Infrastructure Systems Institute, University College London

Professor Sara Walker
Professor of Energy and Co-Director, Birmingham Energy Institute

Professor Paul Watson FREng
Director, UK National Innovation Centre for Data
Professor of Computer Science, Newcastle University

Professor Jeremy Watson CBE FREng
Professor of Engineering Systems, University College London

Kevin Wellman
CEO, The Chartered Institute of Plumbing and Heating Engineering

Dr Dick Whittington FREng
Honorary Professor of Business Innovation, University of York; and Co-Founder, MooD International

Dr Sarah Williamson FREng
Civil Programme Director and Technical Director, Laing O'Rourke

Nick Winser CBE FREng
Chair, Energy Systems Catapult, and Energy Commissioner, the National Infrastructure Commission

David Wright FREng
Director, Electricity Transmission, and Group Chief Electrical Engineer, National Grid

Catriona Schmolke CBE FREng

Non-Executive Director on the Board of Scottish Water

Background

Catriona Schmolke is a highly established business leader with international sustainability and infrastructure engineering background. Currently, she's a non-executive director on the boards of Scottish Water and the UK National Physical Laboratory, and Chair of the Board at Artus Air Ltd. Catriona is former Global Senior Vice President with Jacobs Solutions Inc, with over 35years' experience delivering consulting services, B to B for both the private sector and major government agencies. She was previously a trustee and vice president of the Royal Academy of Engineering and retired Visiting Professor of Sustainability, Risk and Resilience at Newcastle University. Catriona is CEO and Founder of www.charliefive.co.uk providing advisory on business transformation and professional mentoring.

> **"Providing support to the Policy Fellowships programme is a privilege.** It is a simple, rewarding formula. I thoroughly enjoy sharing knowledge, reflecting on experiences, discussing perspectives, and hopefully contributing to the development of future policy."

Acknowledgments and thanks

The Royal Academy of Engineering would like to thank Sir Chris Wormald KCB, Cabinet Secretary of the United Kingdom.

Our thanks also go to the civil service policy profession team, in particular **John Murphy** and **Samuel Carpenter** for their advice and collaboration on our joint knowledge sharing.

We are particularly grateful to Professor John Clarkson FREng for his inspiration and support to the programme, and to all the Academy Fellows and awardees, fellows and staff of the professional engineering institutions and partners of the National Engineering Policy Centre, fellows of the British Academy, and all experts, entrepreneurs and academics who have given their time in 2024 to support the programme and to meet our Policy Fellows.

Policy Fellowships Working Group

Dr David Cleevely CBE FREng (Chair)
Dr Steve Denton FREng
Dame Judith Hackitt DBE FREng
Paul Kett
Paul Taylor CBE FREng
Susan Acland-Hood
Cambyse Jafari-Pak
Jo Reilly

Programme team

Marine Shah, Head of Policy Programmes and Partnerships

Ajo Kacmar, Programme Manager, Policy Fellowships

Mai Al Shamlan, Programme Officer, Policy Fellowships

Shayma Basharahil, Programme Assistant, Policy Fellowships

The Policy Fellowships team would like to express their great appreciation to Academy colleagues for their advice and support, which have made the programme possible.

Apply

Twice a year the Royal Academy of Engineering will select exceptional policymakers to become Policy Fellows.

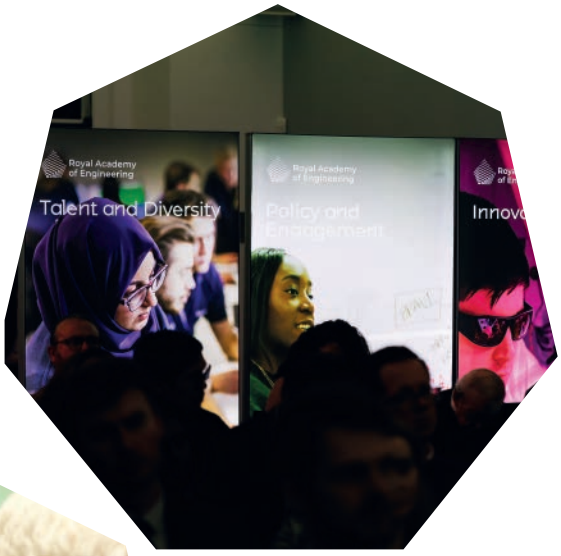
Successful Policy Fellows are civil servants or public servants with responsibility for policy or service design in any sector and with the ability to influence and impact public policy.

The Academy is committed to diversity and inclusion. We welcome applications from a range of backgrounds for example: economics, politics, sociology, health, planning, digital, science or engineering; and from a range of institutions with a public service mission, including central, devolved and local government, arm's length bodies or public agencies.

Key dates

APPLICATIONS OPEN	APPLICATIONS CLOSE	PROGRAMME STARTS
4 March 2025	20 May 2025	September 2025
2 September 2025	18 November 2025	March 2026

For more information, please visit: **raeng.org.uk/policyfellowships**
contact the programme team at **policyfellowships@raeng.org.uk**



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The Royal Academy of Engineering is harnessing the power of engineering to build a sustainable society and an inclusive economy that works for everyone.

In collaboration with our Fellows and partners, we're growing talent and developing skills for the future, driving innovation and building global partnerships, and influencing policy and engaging the public.

Together we're working to tackle the greatest challenges of our age.

What we do

Talent and diversity
We're growing talent by training, supporting, mentoring and funding the most talented and creative researchers, innovators and leaders from across the engineering profession.

We're developing skills for the future by identifying the challenges of an ever-changing world and developing the skills and approaches we need to build a resilient and diverse engineering profession.

Innovation
We're driving innovation by investing in some of the country's most creative and exciting engineering ideas and businesses.

We're building global partnerships that bring the world's best engineers from industry, entrepreneurship and academia together to collaborate on creative innovations that address the greatest global challenges of our age.

Policy and engagement
We're influencing policy through the National Engineering Policy Centre – providing independent expert support to policymakers on issues of importance.

We're engaging the public by opening their eyes to the wonders of engineering and inspiring young people to become the next generation of engineers.

For more information about the Policy Fellowships programme, please visit **raeng.org.uk/policyfellowships** or contact **policyfellowships@raeng.org.uk**

Royal Academy of Engineering | Policy Fellowships

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