Royal Academy of Engineering

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Template Communications Plan

Engineering Zero campaign 2023/2024 FINAL

Contents

Royal Academy of Engineering

Engineering Zero campaign 2023/2024

1. Vision

With less than 30 years until the UK is committed to achieving net zero carbon emissions, policymakers must be able to make confident decisions in the face of uncertainty. The Engineering Zero campaign promotes systems approaches that are informed by engineering principles to help decision-makers reach these urgent decisions and to shape the governance structures needed to achieve net zero. Engineering expertise is central to delivering a transition to a prosperous and sustainable society. Partnership working is at the heart of our approach, and we seek to maximise our impact through collaboration.

The *Engineering Zero* campaign was launched in June 2021 in the lead up to COP 26. The campaign incorporates policy work generated under the Academy's National Engineering Policy Centre (NEPC) programme. Since influencing the Prime Minister's Council for Science and Technology (CST) report on achieving net zero through a whole systems approach in 2020, the NEPC has supported government departments and industries tackling the net zero challenge. The work focuses on three areas: applying engineering principles to decision making; applying systems approaches to the net zero transition whole sectors; and giving technical engineering insight on the role of individual technologies.

The campaign aims to enhance the currency of existing cross-cutting policy work that has been disseminated to government, policy makers, influencers, academia, and industry as part of a joined-up 'show and tell' story telling model while delivering new complementary Engineering Zero initiatives in 2023.

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2. Context: Royal Academy of Engineering 'the Academy'

The Royal Academy of Engineering 'the Academy' 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.

Achieving net zero: we have been a key voice in encouraging policymakers nationally and internationally to take a systems approach and consider 'low-regrets' decision-making' to address this critical challenge.

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3. Context: Objectives of the Academy Communications and Engagement Directorate

- To inform and inspire the public to broaden perceptions of engineering and to encourage the next generation to choose engineering as a career.

- To inform and influence policy makers and business leaders positioning the Academy as a thought leader and partner or advisor of choice in efforts to create a sustainable society and an inclusive economy that works for everyone, and the skills base to support this.

- To engage and empower engineers to work with the Academy, and with our support, to engineer a sustainable society and inclusive economy, and to inspire others to do the same.

What will be different in 2023?

The Communications and Engagement *Business plan April 2023 – March 2025* sets out new how we plan to deliver bigger, more impactful, and more joined up thought leadership and public engagement programmes and campaigns aligned with key themes in the strategy and major projects, including sustainability and inclusion.

Along with *This is Engineering*, the MacRobert Award and *Engineer 2030*, *Engineering Zero* is a priority project that will curate impactful case studies, evidence of impact, research insights and policy recommendations to deliver content, coverage and events that engage the Academy's target audiences. These initiatives will upweight innovation communications to celebrate the 10th Anniversaries of the Enterprise Hub and Africa Prize.

As part of a focus on improving the Academy's thought leadership positioning, *Engineering Zero* will draw together policy and programmes activity to amplify engineering's contribution to sustainability. It will also build an evidence base to help demonstrate progress towards net zero.

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4. Academy strategy underpinning the Engineering Zero campaign 2023/2024

Sustainable society

- Engineers are influential agents of change in the drive for a more sustainable society, in the UK and globally.
- More and better engineering solutions are enabling faster decarbonisation and more sustainable use of resources.
- Engineering expertise is consistently being used to inform and improve government policy on sustainability.

Policy and engagement

- The new Climate and Sustainability Team structure has been established under Andrew Chilvers, Head of Climate and Sustainable Policy.
- We're influencing policy through the NEPC – providing independent expert support to policymakers on issues of importance.

- The Engineering Policy Centre Committee has endorsed the move to broad Communities of Interest to help shape the NEPC's policy work.
- 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.

Engineering Zero campaign communication channels for 2023/24

The first phase of the campaign focused on COP 26 with a burst of communication activities as below using channels that can be replicated in 2023. Out-of-date online content will need refreshing.

2021	2023/24
Online: The campaign delivered https://raeng.org.uk/engineering-zero	Refresh
Engineering stories: Films promoting engineering innovation and perspectives on net zero transition released before, during/ after COP26 featuring change makers UK/ worldwide Complements 2021	Generate a series of new films on a range of topics with focus on cross sector replicable systems approaches and rapid 'low-regrets' decision making
Ask the Engineers: Virtual event series promoting engineering perspective COP26 chaired by *Economist* Science Correspondent, Alok Jha with panelists	Involve more media commentators and panels adding a 'what's happening now angle' on existing published policy showing the Academy is ahead of curve
Workshops: Series exploring practical steps for enacting change through the use of accreditation and CPD processes	Targeted construction/ Infrastructure/energy Working Group: Enabling a net zero electricity grid, Materials and net zero Task-and-Finish group
Ingenia blog Issue 88 September 2021: Professor Roger Kemp MBE FREng	New themes/more voices Members of the NEPC Net Zero Working Group, Working Group: Enabling a net zero electricity grid and Materials
Video explainers: Why a whole systems approach is needed https://nepc.raeng.org.uk/net-zero-videos	Investigate unused footage/repurpose
Social media assets circulated to NEPC/ PEI partners	Repeat
Partnered with Global Youth Engineering Climate Conference pre-COP26 event hosted by National Grid on behalf of the UK Govt.	Engineering X team have secured observer status at UNFCCC COP 28 in Dubai, UAE 30th November –12th December 2023
Media partner: Science Media Centre	Repeat
International Digital Policy Briefings: Council of Academies of Engineering and Technological Sciences (CAETS)	Repeat
Engaging PEI partners	Repeat
Support NEPC working groups in workstreams	Develop Academy thought leaders and commentators
This is Engineering Day 2021**:** Wednesday 3 November in first week of COP26	National Engineering Day is on Wednesday 1 November 2023
	Generate an issues risk register

Engineering Zero campaign video/prints/media coverage collateral to date is at https://raeng.org.uk/engineering-zero and the NEPC website. Media coverage achieved during the first phase of the campaign can help inform a targeted media campaign for 2023/2024.

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5. Engineering Zero campaign 2023/24 target audiences

- Governments and policymakers.
- NEPC, PEIs, engineering community, academia.
- Net Zero Working Party members, industry.
- Targeted media channels.

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6. Communications objectives Engineering Zero campaign 2023/24

Undertaking a step change in our ability to evidence the impact of our Engineering Zero campaign activities in 2023/2024

The Academy's objective is to reinforce our policy message and provide evidence that the following priorities continue to inform our advice to government.

- Applying engineering principles to decision making.
- Applying a systems approach to achieving net zero across whole sectors.
- Providing technical engineering insight on the role of individual technologies.

The Communications Team will liaise closely with the Academy's network of expert and build on its capacity for monitoring, evaluation and data analysis addressing these themes working with the Climate and Sustainability Team and other Programme leads.

The Communications Team will liaise with the Climate and Sustainability Team on positioning around climate and sustainability messaging.

Leveraging value from the existing body of net zero policy work

A key communications objective is to demonstrate the ongoing importance of engineering in achieving net zero emissions in a global and UK energy and economic landscape that has radically changed in the past year. The Russian invasion of Ukraine triggered an energy crisis including an extreme imbalance in oil and gas profits, coupled with industry ambivalence towards setting emissions targets and millions facing uncertainty due to a cost-of-living crisis, natural disasters, and conflict.

Tone of voice

Authoritative, professional, informed, crisp and accessible. Case study content to be inspiring with inclusion of diverse individual voices.
Engaging for Explainer videos, YouTube.

7. What we want people to know about the Engineering Zero campaign 2023/2024

- The Academy effectively connects policymakers with engineering expertise on issues of national and international importance amplifying the impact of the profession on achieving net zero.
- The Academy works collaboratively with a community of world-class experts to generate more and better engineering solutions enabling faster decarbonisation and more sustainable use of resources.
- Policymakers look for external independent advice from the Academy to access in-depth and impartial expertise across industry, academia, and the public sector and to convene cross sector insights.
- Engineers are well placed to bring practical solutions and a systems approach to help policymakers address challenges.

8. The actions we want key audiences to take as part of the Engineering Zero campaign 2023/2024

- Response from government policymakers on Academy inputs for internal understanding to aid improvement and shared messaging.
- Collaborative engagement from government in generating best practice case studies addressing Engineering Zero solutions across infrastructure, transport, energy for internal and external dissemination.
- Engagement with government shaping positioning for COP 28.
- Engagement with industry recruiting Corporate Partners sharing best practice solutions and initiatives including SMEs.
- Engagement from the green/ethical investment community with the Academy addressing net zero investment.

9. How the Academy will benefit

- Map campaign against Academy values specifically: Excellence everywhere - bringing evidence, expertise, integrity and a passion for continuous improvement to everything we do; Collaboration first – prioritising collaboration and building partnerships to improve outcomes; Creativity & Innovation – solving problems and generating opportunities through creative thinking and innovation.
- Map campaign across programmes: UK Talent Engine; Innovation Catalyst; Future Skills Taskforce; Global Challenge Engineering: *This is Engineering*.
- Map campaign against four ambitions: Adopt a goal-focused approach, broaden our engagement, strengthen our funding base and financial, invest in our capability to deliver the strategy.
- Map campaign against NEPC focus: Policymakers are tackling increasingly complex and interconnected challenges; Engineers are well placed to bring practical solutions and a systems approach; Policymakers look for external advice; Policymakers need access to the breadth and depth of the engineering profession.

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10. Key messages Engineering Zero campaign 2023/2024

Focus on urgency and the need to address net zero targets across all sectors and 'live' currency of the Academy's policy work, advice and engagement

- Meeting net zero is an unprecedented challenge that requires coordinated transformation of multiple vital and interconnected infrastructure systems - from transport and housing to agriculture and heavy industry.
- Engineering thinking is at the heart of achieving net zero – engineering expertise is and will continue to be central to delivering a transition to a prosperous and sustainable low carbon economy.
- The researchers we fund are working on solutions in areas relevant to sustainability, including renewable energy, clean drinking water, energy-saving electronic devices, environmental engineering, solar integration, ocean pollution and resilient infrastructure.
- Delivering net-zero in a just and economically beneficial way will require a huge and sustained engineering effort as well as societal, cultural, behavioural and structural change.

Global and national challenges require an accelerated response from the engineering community

Since the *Engineering Zero* campaign launch in 2021 there has been a transformation in the global and UK political, energy and economic landscape.

International

- Global impact of Russia's invasion of Ukraine on 24 February 2022 on world energy supply, distribution, and costs. The West demonstrates an accelerated pace of adaptation including Germany's defense policy transformation.
- Companies are underprepared for regulation including EU, UK Transition Taskforce (TPT) and Securities Exchange Commission (SEC) legislation. Risk of multiple litigation. Power generation and infrastructure industries most likely to disclose to key indicators.
- Global Oil and gas companies making vast profits. US oil and gas IPOs in the pipeline with investor hunger for cash-generating businesses.
- What will be the Academy's messaging for the UN Climate Change Conference (UNFCCC COP 28) in Dubai, UAE Thursday 30th November – Tuesday 12th December hosted by Dr Sultan Ahmed Al Jaber, Minister of industry and Advanced Technology and Special Envoy for Climate Change.

UK government changes

- The new Department for Energy Security and Net Zero 'securing our long-term energy supply, bringing down bills and halving inflation'. Rt Hon Grant Shapps MP, Secretary of State for Energy Security and Net Zero. Energy.

- Department for Science, Innovation, and Technology. Rt Hon Michelle Donelan MP, Secretary of State for Science, Innovation and Technology State.
- Government published its updated plans to achieve net zero on 30 March 2023 in the form of the energy security strategy, aiming to boost the UK's energy security and independence and reduce household bills for the long term and maintaining a world-leading position in achieving net zero. The Academy's response is here.

Industry

- The CBI, a coalition of energy industry groups, argue that the Biden administration's Inflation Reduction Act and the proposed strengthening of the EU's green industry support package means the UK has to move swiftly to ensure the UK does not start to lag behind its economic competitors in the development of the low carbon industries that will dominate the coming decades.

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11. Communications Plan Engineering Zero campaign 2023/2024

Highlighting the evidence that the campaign is making a difference with key audiences and wider society

A: Highlighting the relevance and currency of published net zero policy

A prime focus is highlighting evidence that our policy advice has impact. This involves consolidating and broadcasting evidence about impacts of the existing body of policy work generated in 2021 and 2022 addressing net zero as a joined-up narrative.

A systems perspective and 'low-regrets' decision making have cross-sector application and inform Academy initiatives in 2023: NEPC Working Group on enabling a net zero electricity grid and Briefing series: Materials and net zero. Leveraging the relevant value of existing net zero policy work helps avoid duplicating quality technical work.

Capture responses from policymakers and adoption by industry bodies and adoption/implementation by industry with case studies, up-to-date thought leadership.

Integrate targeted communications activity focused on updated thought leadership to help keep published policy 'live' and current, focusing particularly on the following NEPC publications:

- September 2022: '*The role of hydrogen in a net zero energy system'.*
- May 2022: '*Net Zero: A systems perspective on the climate challenge' Achieving a thriving, low-carbon economy through rapid and large-scale systemic.* Cross sector. The policy paper highlights the value of taking a systems approach to delivering decarbonisation policies. The systems approach is used in engineering to address complex problems and in involves integrating all relevant factors and wider contexts into decision-making processes. This approach can help

policymakers address many of the challenges associated with achieving net zero. It can help them manage complexity, accelerate urgent, coordinated change across many sectors at once, while minimising unforeseen and unintended negative consequences.

- November 2021: '*Rapid 'low-regrets' decision making for net zero policy*' Cross sector. The policy paper sets out a framework that can guide government decision-making on tackling carbon emissions across the UK and can be used to identify urgent, 'low-regret' decisions that can be made now that will have a significant impact on decarbonisation while unlocking pathways towards the net zero target.
- September 2021: '*NEPC Decarbonising Construction; building a new next zero industry*' *Four missions to transform and decarbonise the build environment.*

Reach out to the Academy community

- Engage with the members of the NEPC Net Zero Working Group determining spokespeople for 2023 (Appendix A).
- Proactively call for input off from relevant Academy programmes and project leads to identify positive impacts working with clients and partners.
- Proactively collaborate with the NEPC and PEI partners (Appendix B).
- Proactively call for input from Academy Fellows and awardees including becoming Engineering Zero campaign 2023 Ambassadors.
- Proactively reach out to the Corporate Membership and industry representatives sitting on the work parties to provide voices.

Further actions

- In line with the 2020 - 2025 strategic pledge to measure/ report impact of published reports for external messaging to wider audiences re-engaging with partners/stakeholders/contributors/members NEPC Net Zero Working Group and NEPC community.
- '*Net Zero: A systems perspective on the climate challenge'* Measure progress against: Simultaneous transformation of vital, interconnected infrastructure systems + A step change in policies, practices and behaviours to address the challenge of net zero territorial emissions. Liaising with the Climate and Sustainability Team, revisit Annex A case study: decarbonisation of homes with any relevant government policy updates that have been reported in recent news stories. Newsletter content.
- Identify sector specific examples to add detail to: There is no single way of 'taking a systems approach' to decarbonisation. Even for one policy challenge, there are multiple methods and tools within the field of systems science each suited to specific purposes or sets of questions. The approaches often draw upon common insights and share a common focus on understanding the whole system, recognising that it is complex, and has emergent properties that arise from the way different elements interact. This applies whether the system being studied is a town, a company, an economic sector or a rail network.
- '*Rapid 'low regrets' decision making for net zero policy* Build narrative about application/implementation of rapid 'low regrets' decision making for net zero policy and engagement. Liaising with Climate and Sustainability Team, generate additional replicable sector specific case studies to complement existing ones

on building retrofit, battery electric (BEV) charging network, deployment of critical technologies e.g., Hydrogen and carbon capture.

Actions to audit/revisit talking heads/video/blog/online/media

- Identify 'talking heads' and thought leaders in the NEPC Net Zero Working Group for media training and inclusion in PR notices, positioning statements, webinar Critical Conversations, In Conversation Zoom events, Blogs, Roundtables, Newsletters, *Ingenia* magazine and newsletter. (Appendix A).
- Identify targeted PEI partners with work aligned with the Academy (Appendix B).
- Liaising with the Climate and Sustainability Team address how to repurpose/ promote the net zero video explainer series identifying unused content (Appendix C).

Follow up the Academy's own reporting to highlight evidence to create additional stories/content/new voices/PR

The Academy highlighted where the Engineering Zero Campaign/ net zero challenge has had impact to date in *Royal Academy of Engineering 'Annual Report and Accounts 2021/2022'.*

Undertaking a step change in our ability to evidence the impact of our activities		
	Academy reporting on net zero	**Actions 2023**
1.	We advised government on achieving a thriving, low carbon economy through our work on **applying a systems approach** to the net zero challenge	Identify new areas of engagement going forward to refresh the messaging in ***Net Zero: A systems perspective on the climate challenge (*22 May 2022)** Measure progress against: Simultaneous transformation of vital, interconnected infrastructure systems + A step change in policies, practices, and behaviours to address the challenge of net zero territorial emissions.
2.	35 of the 93 Research Fellows we fund are working on sustainable technologies, including renewable energy, clean drinking water and energy-saving electronic devices	Identify projects aligned with the campaign as case studies/news stories and new voices.
3.	We've supported 100 UK start up, spinout and scaleup companies working on sustainability solutions	Identify start up, spinout and scaleup endeavours addressing solutions as case studies/news stories and new voices
4.	The Academy is an **influential voice** in encouraging policymakers nationally and internationally to take a systems approach and consider 'low regrets decision making' to address net zero.	NEPC Net Zero Working Group. Determine key spokespeople with expertise on specific topics/themes for thought leadership
5.	In September 2021, we published **Decarbonising construction: building a new net zero industry**, which outlined specific actions for the construction sector is to contribute to achieving net zero.	***NEPC Decarbonising Construction; building a new net zero industry* (September 2021).** Three years on revisit industry specific consultants, client organisations, policy makers, academics and others who attended the original workshop in Jun - 20 (50 in all) *(See separate detailed comms plan)*
6.	November 2021, we produced a **rapid low regrets decision-making framework for net**	***Rapid 'low regrets' decision making for net zero policy* (November 2021)** Build narrative about

	zero policy, to guide government decisions on tackling carbon emissions across the UK. Raft activity in the run up to/ during UN Climate Change Conference, COP26.	application/implementation of rapid 'low regrets' decision making for net zero policy and engagement.
7.	Our Engineering Zero campaign (initiated January 2020) highlighted and promoted the **crucial contribution engineers can make to move us closer to achieving a thriving, low carbon economy and reaching the net zero future required to stabilise our climate.**	Address how Fellows can contribute as well as Corporate Partners with approaches to accelerating net zero. Bring in new voices.
8.	Our **Getting to net zero video explainer series** was launched as part of the campaign, featuring experts, innovators and entrepreneurs explaining why reaching net zero in time requires a new approach to transforming infrastructure, and how to tackle such a complex and broad challenge	Revisit existing and unused material

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Build a narrative around construction industry engagement that will lead into new policy work on materials

Track responses to/outcomes of '*NEPC Decarbonising Construction; building a new next zero industry*' *Four missions to transform and decarbonise the build environment* published in September 2021.

It is three years since 50 consultants, client organisations, policy makers and academics attended a workshop to form the basis of policy recommendations. Are there measurable impacts based on the Academy paper's recommendations addressing four interconnected missions cutting across construction sector across a sequencing framework of actions: **Now (2021), Next (by 2025)** and in the **Future (beyond 2025)**. Timely to investigate progress within the **Now** and **Next** timelines.

Four interconnected missions

- Design and specification. Desired outcome: Setting progressive targets – a government/industry partnership improving skills for net zero.
- Changes to procurement. Desired outcome**:** Embedding quantitative whole-life carbon assessment into public procurement.
- Construction and reuse. Desired outcome: Increasing design efficiency, materials reuse and retrofit of buildings.
- Product outcomes. Desired outcome**:** Improving whole-life carbon performance.

Six systems levers

- Setting and stipulating progressive targets for carbon reduction.
- Embedding quantitative whole-life carbon assessment into public procurement
- Increasing design efficiency, materials reuse and retrofit of buildings.
- Improving whole-life carbon performance.
- Improving skills for net zero.

- Adopting a joined up, systems approach to decarbonisation across the construction sector and with other sectors.

Six desired outcomes to assess performance

1.The construction sector should adopt the same carbon emission reduction targets as the national targets of 68% and 78% by 2030 and 2035 respectively, compared to 1990 levels. These recommended percentage reductions should include embodied carbon of built infrastructure, including that of imported construction materials, not just the scope of emissions included in the UK carbon budget. More stringent targets for operational carbon of the built environment are also required to achieve net zero. Responding to these targets, government and industry must jointly introduce an ambitious but achievable decarbonisation roadmap to 2050 guided by a vision of a net zero future, that covers changing demand and outcomes-based decision making.

2.The construction sector must support the implementation of the updated guidance for appraising environmental impacts defined in HMT Green Book which is aimed at ensuring that interventions are first appraised in terms of their contribution to the net zero target. This should include adopting the principles outlined in the Transforming Infrastructure Performance report by the IPA.

3.Current design and performance standards need to be immediately and continually updated. This should enable more holistic design approaches for the built environment that support efficient design and material reuse. In addition, the updated standards must ensure that all future projects, including those that are part of the economic stimulus following the COVID-19 pandemic, are obligated to contribute to meeting net zero. It is important that proactive action in design is taken to integrate thinking on infection control and energy efficiency to prevent increasing susceptibility to infection and other health risks as the UK moves towards the net zero target. These updated standards for design and construction will need to be accompanied by subsequent assessments of performance in use of completed projects.

4.Government and the construction sector must rapidly define and scale up best practice in low carbon construction and procurement, applying it to all new build and refurbishment projects by 2025. This must be underpinned by a different approach to productivity performance and risk, with digitalisation a key enabler.

5.To achieve a shift in culture in the construction sector, net zero and sustainability principles and practices must be a mandatory inclusion in engineering education, continuous professional development, and upskilling. Increasing the understanding and skills needed for net zero is required to both enable good decision-making for net zero and for having the skills needed to implement these decisions.

6.Government should apply a systems approach37 to ensure that total emissions from construction are minimised. Net zero emissions will not be achieved solely by building less and retrofitting existing building stock. Radical new systems need to be created that enable us to undo the last 200 years of fossil fuel dependency. By employing a systems approach, policies for the built environment and construction can maintain consistency, join up and coherence across national, local and devolved government and have clear co-benefits that place social, economic, and environmental outcomes at their heart. This includes addressing any conflicts between net zero and infection resilience, particularly ventilation.

Further actions

- Liaising with the Climate and Sustainability Team and Corporate Members teams, generate an industry/RAEng survey on progress on four interconnected missions cutting across construction sector.
- With key infrastructure focused Corporate Partners generate replicable case studies identifying sector roles/specialisms.
- Commenting on the government's newly announced plans for energy security and net zero growth, Professor Sir Jim McDonald FREng FRSE, President of the Royal Academy of Engineering calls for retrofit measures to be coupled with efforts to ensure that the skills, supply chains, governance and assurance mechanisms are in place if we are to succeed in future-proof UK housing.
- Create a data capture template for internal RAEng measuring/reporting**.** C:\Users\Sue.Garland\OneDrive - Royal Academy of Engineering\Sue Garland\Decarbonising Construction 2023
- Laing O'Rourke Centre for Construction Engineering and Technology addresses shape of sector with Academy depicted as outside any commercial networks as a 'charity'. It highlights champion/commitment schemes for industry: Business Champion, Carbon Reduction Code for the Built Environment, RIBA 2030 Climate Challenge, World G Net Zero Carbon Buildings Commitment, Climate Commitment Platform, BBP Climate Commitment, Pledge to Net Zero, Net Zero Carbon Buildings Commitment + CO2nstruct Zero, the construction sector's response to getting to net zero by 2050.
- With the Policy Team review how the Academy/NEPC views the industry landscape depicted by the Laing O'Rourke Centre for Construction Engineering and Technology https://kumu.io/terciajvv/decarbonising-construction-landscape-map#industry-landscape
- Liaising with the Public Affairs and Climate and Sustainability Team to log timeline of relevant legislation/amendments UK/Devolved Administrations legislation/policy impacting the built environment sector.

B. Communications planning supporting new initiatives under the Engineering Zero campaign

Systems-based technoeconomic analysis of alternative pathways for provision of maritime fuel at UK ports (report due to DfT end April 2023)

- December 2022, the DfT approached the Academy to commission a high-level analysis of alternative pathways for provision of maritime fuel at UK ports, considering issues such as import/domestic production balances, demand locations, resource implications, cost and spatial and logistical implications.
- The DfT asked for the project to be delivered over a 3-month period so that the findings of the commission can feed into an upcoming transport decarbonisation plan. This has implications for the review process.
- The Academy commissioned the Sargent Centre, led by Profs Nilay Shah and David Bogle, to carry out this analysis.
- The Sargent Centre have analysed hydrogen, methanol, ammonia and synthetic hydrocarbons against these aims, with low carbon/renewable electricity providing the energy. The analysis is based solely on research

already carried out.

NEPC Working Group on enabling a net zero electricity grid

Following the UK government's commitment to a fully decarbonised power system by 2035, there is consensus among the engineering community that there is a gap in understanding of taking a systems approach to realise a net zero power system.

Eight roundtables are being convened (under Chatham House Rules) providing expert insights from across the NEPC network to key policymakers and regulators. These will build a shared understanding and recognition of the actions and barriers needing to be addressed to implement a net zero electricity grid system.

The NEPC Working Group on enabling a net zero electricity grid represents the diversity of the profession in accordance with the Academy's diversity and inclusion policy and will collectively be able to provide an interdisciplinary approach to the subject. This work is administrated by a secretariat team within the Engineering Policy Department.

At the NEPC Working Group on enabling a net zero electricity grid meeting on April 4 2023 Simon Harrison said: "We're chasing a moving target in this work and that to be relevant, we are going to have to be fresh on where the target is. There's quite a challenge keeping up." Addressed where to position post *Skidmore Net Zero Review: UK could do more to reap economic benefits of green growth* (September 2022), NAO *Decarbonising the Energy Sector* (March 2023) and CCC *Delivering a reliable decarbonised power system* (March 2023).

Roundtable summaries will inform external communication collateral

Written summaries of the roundtables will record key discussions items, findings, and recommendations. They will be used to inform information for wider dissemination and continuous influencing of relevant policy decisions. Infographics or multi-media content (such as explainer videos) may/will be required to highlight key aspects.

Project Aims

1. Despite promising progress in decarbonising the electricity supply, there are still significant gaps in understanding how to take a whole-systems approach to realise a net zero power system. Following the UK's government commitment to fully decarbonise the power system by 2035, the focus needs to be on implementation and delivery. This requires understanding of the future system that is required, and the enabling actions and barriers that need to be addressed to implement the future electricity system.

2. The engineering community produces quality technical work on various aspects of the future, net zero compatible, power system. This project will build on and avoid duplicating quality technical work by focusing on /convening a series of roundtables that convey the key findings and build a better shared understanding of, and impetus for, the actions needed to realise a net zero electricity grid. In this way, the roundtables will draw on the convening power of the NEPC and its partners to build clarity on the actions needed to realise key aspects of the future power system and to communicate and influence key decision makers.

3. Based on a review of completed work, the key aspects of a net zero power system including electricity generation, electricity network, flexibility and digitalisation are identified, and the key barriers and enablers of each aspects need to be addressed as follows:

- **Electricity generation**
  - Speed up renewables deployment to meet the levels of renewables required to achieve the government's 2035 target of a fully decarbonised power system.

- **Electricity network**
  - Establish the Future System Operator to oversee the overall transition of the power system and provide whole system architecture design and coordination.
  - Develop frameworks to identify network requirements for a net zero electricity network and direct investments in network upgrades.
  - Increase coordination and implement multi-purpose interconnectors for offshore coordination upon the result of the Offshore Transmission Network Review.
  - Develop commercial models and identify late-stage R&D needs for supporting the development of existing and emerging technologies for providing system services.

- **Flexibility**
  - Develop suitable market and regulatory frameworks and digital infrastructure to enable demand side flexibility.
  - Develop a market design that recognises the value and benefits of long-duration electricity storage.

- **Digitalisation**
  - Develop the digital infrastructure which enables systems interoperability, consumer actions and assets, data visibility and automation, and dynamic carbon monitoring and accounting.

4. These topics will be framed within a whole system context, considering their inter-relationships with each other, and with other aspects of the electricity system, the role of the electricity system within the energy system, and other systems serving society. These topics will be discussed at the first working group meeting and refined or amended as appropriate.

Project outputs

- The roundtables will be convened with key stakeholders around the key aspects of the net zero system, directly influencing key decision makers through surfacing key issues (enablers and barriers) that need to be addressed and discussing these in an expert, evidence driven way with key stakeholders. Roundtables will cover the key topics for key audiences. Roundtable design and format will be discussed and decided by the working group for achieving maximum possible impact and influence. The working group will leverage their connections across the sector.

Sir Jim MacDonald FRSE FREng, Academy President addressed to the first meeting of the Working Group with the following points:

"I think for the first time we could take a whole system perspective of how this grid evolution would recognise technological innovation and advancement, societal and economic impact, understand the need to deliver on key high end policy objectives. "

- The Academy should start conversations with those we want to be in receipt of our recommendations before they're all concluded so they feel a sense of direction of travel.
- The Academy's converged approach doesn't just tackle technology. What does this grid evolution do for society. How does it engage consumers? How does it accelerate the decarbonisation in cities, in the built environment and in the way that we connect low-carbon sources for greater efficiencies to be had.
- The policy piece is critical. A convergence of technology, policy, economics, society.
- Government to take advantage of Academy's advice over several years, taking that systems approach *into* government.
- Move the policy rhetoric into action in terms of investment. Identify investment impediments inhibiting innovative investment in network grid technologies.
- NEPC evolved into a platform on which the PEI's can work together with others. Build on long term Academy engagement with IET, ICE and IMechE - all produced solid work on the need.
- Anticipation of delivering robust contribution based on expertise of working party. We apply a systems perspective.
- 1926 Electricity Supply Act. We can reimagine what a grid for the 21st century looks like a century on.
- Sir Patrick Valance's final task bits to propose a more innovation friendly regulatory environment and the big three areas will be around life sciences, green tech, AI and digital which is relevant to a smart, decarbonised grid.
- Think around that policy, economics, technology, society, and thoughts to the regulatory frameworks. Encouraging that Ofgem and Innovate UK have partnered to create the Strategic Innovation Fund. £450million is a lot of money but that's not going to be the quantum that's going to move the dial.

Target audiences

- Policymakers within the restructured Department for Energy Security and Net Zero charged with boosting Britain's energy supplies and its transition away from fossil fuels and new Department for Science, Innovation and Technology.
- Regulators.
- PEI partners from the NEPC, Fellows, individual experts.

PEI partners	
Electricity generation	DESNZ, DSIT, Ofgem, IET, EI, CCC, ESC, ORE Catapult, Regen, Supergen ORE, UKERC, industry
Electricity network	DESNZ, DSIT, Ofgem, National Grid, ESO IET, EI, ESC, CCC Regen, Supergen, Energy Networks Hub, UKERC, Industry
Flexibility	DESNZ, DSIT. Ofgem, National Grid, ESO, IET, EI, ESC, CCC, Royal Society, Regen, UKERC, CREDS, Industry

Digitisation	DESNZ, DSIT, Ofgem, National Grid, ESO, Royal Society, ESC, Energy digitalisation taskforce, industry

NEPC Working Group on enabling a net zero electricity grid

Dr Simon Harrison (Chair), Mott MacDonald; IET

Eric Brown, Energy Systems Catapult

Tim Chapman FREng, Arup; ICE

Peter Dearman, PWI

Robert Friel, Apteno Consulting; IET

Professor Tim Green FREng, Imperial College London

Steve Holliday FREng, Former President, Energy Institute

Professor Nick Jenkins FREng, Cardiff University

Professor Roger Kemp FREng, Lancaster University

Dr Cathy McClay FREng, NEOM

Graham Oakes, Local, Community and Municipal Energy

Melissa Stark, Accenture; EI

Project Outcomes

Working Group meetings
- Scoping on topic area, knowledge gaps and policy asks
- Met on 30 January and 14 March.
- Next meeting – 28 April, with a further two meetings planned.

Framing Paper
- Describe the complexity of the topic and the direction of focus.
- Establish priority areas and define roundtable themes.
- Outline a delivery plan for decarbonising the electricity grid by 2035.

Roundtables and infographics
- Commission infographics to support roundtable discussions.
- Organise roundtables by priority themes and elements of the delivery plan.
- Bring together stakeholders from civil society, government, industry, PEIs, and academia from local and national levels (led by WG members)
- Collate output materials and finalise plans for written outputs.

Synthesis Paper
- Conclude all roundtable events.
- Finalise roundtable outputs and publish them.
- Develop a synthesis paper highlighting major findings.

Communications objectives

Key messages

- The NEPC Working Group on enabling a net zero electricity grid will help to advance understanding of how to use a whole-systems approach to realise a net zero power system.
- This work will lead to a greater shared understanding and recognition of the actions and barriers that need to be addressed to implement a net zero electricity grid system.
- Eternal communications campaign following the reporting outcomes: Re-imagining a net zero electricity grid for the 21st century 100 years after the 1926 Electricity (Supply) Act enabled the construction of the National Grid.

What we want people to know about the Working Group: Enabling a net zero electricity grid (internal communications)

- Policymakers: First time taking a whole systems perspective of how this grid evolution would recognise technological innovation and advancement, societal and economic impact, understand the need to deliver on key high end policy objectives
- Policy piece critical. Convergence of technology, policy, economics, society.
- This work talks to citizens and consumers revolutionising the way we consumer/use/buy energy.

The actions we want our audiences to take following the outcomes of the Working Group: Enabling a net zero electricity grid

- Government to take advantage of the Academy's advice over several years, taking a systems approach *into* government.
- The Academy continues conversations with those we want to be in receipt of our recommendations after they are concluded with the Academy remaining in a close loop.
- Academy to have inputs into the regulatory frameworks.

How the Academy will benefit

- The NEPC Working Group on enabling a net zero electricity grid will deliver a robust contribution applying a systems perspective.
- NEPC is a platform on which the Professional Engineering Institutions (PEI's) can work together with others. Builds on long term Academy engagement with IET, ICE and IMechE - all produced solid work on the need.
- Recognition of the Academy's role in helping move the policy rhetoric into action in terms of investment. Identify investment impediments inhibiting innovative investment in network grid technologies. Opening up a target market for recruitment of Corporate Partners.
- In 2026 the Academy launches Re-imagining a net zero electricity grid for the 21st century 100 years after the 1926 Electricity (Supply) Act enabled the construction of the National Grid.

Briefing series: Materials and net zero and the establishment of a Task-and-Finish group

Material sustainability is a significantly underserved aspect of the net zero transition, with a lack of clear lines of governance, and its relation to net zero often being obscured by lack of data and its indirect relationship to atmospheric greenhouse gas emissions.

Greater awareness and intervention on material sustainability have significant potential for reducing global greenhouse gas emissions through reducing embedded carbon, the emissions associated with extraction, processing and manufacturing, the carbon intensity of different supply chain infrastructures, and their resulting impacts on infrastructure choices and consumption patterns.

Solutions and interventions can have significant co-benefits for supply chain resilience and in mitigating health and social impacts. This topic is of importance to policymakers, industry, research, media and the public.

There may be links to themes and policy recommendations on reuse and circular economy in the built environment in *NEPC's Decarbonising Construction report*.

Formal proposal for developing a briefing series

Formal proposal to the Net Zero Working Group (NZWG) for a new workstream for the development of a briefing series on the topic of materials and net zero and the establishment of a Task-and-Finish group to deliver this work. Planning, design and writing phase 2023. Completion full series in early 2023. The first role of the working group will be to develop and finalise these plans, possibly hosting a workshop to gather wider input.

Professor Joan Cordiner FREng is Chair of the new NEPC working group on Materials for Net Zero. This will be a core group who bring in other experts as needed for the topic/briefing at hand.

Themes

- Identifying vulnerabilities in materials supply chains and building resilience and net zero compatibility.
- Minimising embodied carbon in existing materials and supply chains, including designing to address scarcity.
- Critical rare materials in the context of the net zero transition.
- End-of-life impacts
- References to systems factors involved including non-CO_2 environmental impacts and equity issues associated with the topic.

Outcome

Individual briefings designed around specific topics. Each addresses an individual topic and question with the following outcomes in mind:

- Improved general awareness of the links between materials, sustainability, and net zero and how to incorporate strategies for more sustainable outcomes.
- Awareness/ understanding links to issues human rights and just transition.
- Greater understanding of possible, practical approaches and solutions.

- Ensuring any necessary consistency of approach between outputs and overall coverage across topics will be the purview of the Task-and-Finish Group.

Methods

- Short, accessible and newsworthy publications on a range of issues, the content and format being designed between Secretariat and the Task and Finish group.
- Potential commissioning of research/content production.
- Academy scoping the potential for sponsoring a public deliberation exercise, which could potentially inform/ be part of this work.
- The group will design and begin production on all outputs in advance of beginning publication of any one output.

A range of output media (written, infographic, video, animated, podcasts, live recordings) will be considered to enable a range of audiences to be reached, depending on the target audience for each output.

Audiences/stakeholders

- A 'broad audience' will be targeted by the series as a whole but, for each sub-topic, specific audiences will be further defined, and outputs designed accordingly. While outputs are intended for a broad audience, they are expected to appeal primarily to those with a personal or professional interest in the issues and should be developed as such.
- A key aim will therefore be to convey technical information accessibly and to draw out key messages as they relate to government, regulators, business, and research.
- Media coverage required.

How the project will benefit the Academy

- Inform and support better:
  - Policymaking and regulations for materials and their supply chains.
  - Engineering practice.
  - Research agendas through improving knowledge, understanding and interest level in the subject of material sustainability.
  - Highlight opportunities through examples of good practice.
- Be accessible to a wide audience to generate awareness and a more functional understanding of material sustainability among a wide range of audiences.
- Highlight important and newsworthy topics to increase audience interest and engagement.

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12. Communications collateral/assets across all workstreams in the Engineering Zero campaign 2023/2024

Internal Academy Delivery mechanisms	Purpose	Priority 2023
Engineering Zero Thought leadership	Drawing together policy and programmes activity to amplify	

	engineering's contribution to sustainability	
New website	Additional content/stories/case studies/add timely elements	
Critical Conversations	Introduce key programmes/ themes bi-monthly	
Thought leadership dinners		
Policy briefing		
Flagship lecture		
Fellowship engagement	Technical briefings, self-convening.	
Programme events		
Engineering zero industry days		
Engineering Stories		
Ask the Engineers		
Workshops		
Ingenia newsletter/issues		
Video explainers		
Digital policy briefings		
Links to partner home pages		
Surveys		

Preferred Media channels for coverage

National dailies: *FT, Times, Guardian, Telegraph* – identified specialist correspondents, targeted section editors.
Sundays: *Sunday Times, Observer, Sunday Telegraph, Weekend FT*.
Weeklies: *Economist, New Scientist, New Statesman, Wired*.
Broadcast/Radio: BBC, Sky, Channel 4 + local stations.
Trade press: Engineering, environment, architecture, local government.
Regional media/online PEI journals/online University journals, corporate partner sites and journals.
PEI press officers. Catapult press officers. Corporate Member press officers.
Social media: LinkedIn, Twitter, TikTok.
Influencer blogs.
Government sites.

To come

Other considerations: Are there any issues or political constraints? Does the activity link to any major news stories currently in the news or current issues? Political sensitivities/ issues that you are aware of ahead of time?

Engineering profession guidance/notification: Optional: To consider if announcement involves the wider profession particularly PEIs whose CEOs and/or comms staff should be notified in advance.

KPIs desired outcomes: Quantitative e.g. numbers of articles (broken down by media type of media cost per 1,000 people reached; and qualitative measures e.g. proportion of articles that contain at least 2 key messages, proportion of articles that use a quote from a spokesperson.

Diversity and Inclusion: Please keep in mind the Academy's policy on equality, diversity and inclusion when working on any communications activities.

13.Timeline policy and communications activity 2023/2024

I think JT wants an overall timeline developed? See email Thu 02/02/2023

Commented [JS1]: Yes please - it could be done by quarter

Commented [SG2R1]: Just talked to Shema who says there should be be dates on the slides this afternoon that will provide more of a skeleton structure to build on

14.Timeline policy and communications activity 2023/2024	
Q4 2022-2023 - Q3 2023-2024	Engineering Zero Campaign
Q4 2022-2023 (Jan - March 2023 + Q1 2023-2024 Apr-Jun 2023	*The role of hydrogen in a net zero energy system'.*
Q4 2022-2023 (Jan - March 2023 + Q1 2023-2024 Apr-Jun 2023	*Decarbonising Construction: building a new zero industry'*
Q4 2022-2023 (Jan - March 2023 + Q1 2023-2024 Apr-Jun 2023	*Net Zero: A systems perspective on the climate challenge'*
Q4 2022-2023 (Jan - March 2023 + Q1 2023-2024 Apr-Jun 2023	*'Rapid 'low regrets' decision making for net zero policy*
Q4 2022-2023 (Jan - March 2023	Additional work on Academy input into the Skidmore Review

Working Group: Enabling a net zero electricity grid timeline	
Scheduled Working Group meetings	Monday 30th January 2023 14:00 -16:00 Tuesday 14th March 10:00 - 12:00 Friday 28th April 10:0 -13:00
External industry/media event opportunity to announce this policy work	• The President is speaking at the All-Energy Conference: Engineering a net Zero Future 10-11 May, SEC Glasgow
Q4 2022-2023 (Jan – March 2023	• Develop detailed scoping for the roundtables • First working group meeting in late Jan/early Feb • Planning for content development activities • Stakeholder mapping for roundtables
Q1 2023-2024 (Apr - Jun 2023):	• Content and messaging development for the roundtables, including commissioning any materials, such as infographics, as appropriate • Stakeholder engagement and scheduling for roundtables
Q2 2023-2024 (Jul – Sept 2023):	• Host at least the first roundtable event • Collate output materials and finalise plans for written outputs
Q3 2023-2024 (Oct – Dec 2023	• Conclude all roundtable events

	• Develop, review and finalise written outputs, including any commissioned materials, such as infographics. • Publish written outputs.

14. Key stakeholders

Appendix A

NEPC Net Zero Working Group members	
Individual	**Topic/Spokesperson 2023**
Dervilla Mitchell CBE FREng Chair	
Professor Nilay Shah OBE FREng Vice-Chair	
Mark Apsey MBE Chair, Institution of IChemE Energy Community of Practice	
Dr Jenifer Baxter Chief Engineer, Institution of Mechanical Engineers	
Professor Harriet Bulkeley FBA Durham University	
Dr Mike Cook FREng Director Buro Happold; Adjunct Professor, Imperial College: IStructE Head of Climate Emergency Task Group	
Ian Gardner Global Energy Leader, Arup	
Dr Julie Godefroy Head of Sustainability Chartered Institution of Building Services Engineers	
Professor Jim Hall FREng University of Oxford; Vice President of the Institution of Civil Engineers	
Dr Simon Harrison Institution of Engineering and Technology, and Group Head of Strategy, Mott MacDonald	
Steve Holliday FREng President, Energy Institute	
Professor Roger Kemp MBE FREng Lancaster University	
Professor Rebecca Lunn MBE FREng FRSE University of Strathclyde	
Ian McCluskey Head of Technical and Policy Institution of Gas Engineers and Managers	
Emeritus Professor Susan Owens OBE FBA University of Cambridge	
Dr Sophie Parsons National Composites Centre; Strategic Advisor Institute of Materials, Minerals and Mining	
Nick Winser CBE FREng Chair, Energy Systems Catapult	

Appendix B

PEI partners on the journey to net zero The Academy works closely with: Chartered Institution of Building Services Engineers (CIBSE), Energy Institute (EI), Institute of Materials, Minerals and Mining (IOM3), Institution of Chemical Engineers (IChemE), Institution of Engineering and Technology (IET), Institution of Gas Engineers and Managers (IGEM)		
Organisation	**Focus**	**Engagement**
Chartered Institution of Building Services Engineers (CIBSE)*	The professional engineering institution for building services. Our members design, install, operate, maintain and refurbish life safety and energy using systems installed in buildings.	

Chartered Institute of Plumbing & Heating Engineering (CIPHE)	UK's professional and technical body striving to raise standards of plumbing and heating for the public benefit	
Chartered Institution of Civil Engineering Surveyors (CICES)	international body for the regulation and training of civil engineering surveyors, with varying membership grades, plus competencies for geospatial engineers and commercial managers	
BCS	The Chartered Institute for IT BCS is the professional body for the information technology profession. BCS engages in thought leadership, promoting the education and practice of computing for public good	
British Institute of Non-Destructive Testing (BINDT)	Promoting the advancement of the science and practice of non-destructive testing (NDT), condition monitoring (CM), diagnostic engineering and all other materials and quality testing disciplines	
Chartered Association of Building Engineers	CABE brings members together to create a community of like-minded professionals who believe in collaboration and communication. Focused on developing professionals, sharing knowledge, and raising standards	
Chartered Institution of Highways and Transportation (CIHT)	CIHT provides strategic leadership and support to help our members develop, deliver and maintain sustainable solutions for highways, transport infrastructure and services	
Chartered Institution of Water and Environmental Management (CIWEM)	CIWEM represents a community of thousands of members and organisations in over 89 countries, dedicated to improving water and environmental management for public benefit	
Energy Institute (EI)**	The chartered professional membership body for people who work in energy, creating a better future by accelerating the global energy transition to net zero.	
Engineering Council	Sets and maintains internationally recognised standards of engineering competence and commitment, holding the national register of professionally recognised engineers and technicians	
EngineeringUK	Works in partnership to inspire the next generation of engineers and to better understand and address the barriers to participation in STEM education and training.	
INCOSE UK	Aims to foster the definition, recognition, understanding and practice of world class Systems Engineering in Industry, Academia and Government	
Institute of Acoustics (IOA)	Institute of Acoustics (IOA)	
Institute of Explosives Engineers (IExpE)	Diverse membership base for anyone working in or connected with the explosives industry, providing membership categories for all levels and many member benefits	
Institute of Healthcare Engineering and Estate Management (IHEEM)	UK's largest independent professional body dedicated to supporting the development of healthcare engineers and estates and facilities professionals across all levels	
Institute of Measurement and Control (InstMC)	Professional Engineering Institute and international network of engineers and scientists working within the measurement, automation, and control fields	
Institute of Physics (IOP)	Professional body and learned society for physics in the UK and Ireland, promoting	

	cooperation and accessibility in physics around the world	
Institute of Physics and Engineering in Medicine (IPEM)	Mission is to improve health through Physics and Engineering in Medicine	
Institute of Highway Engineers (IHE)	IHE membership formally recognises your qualifications and industry experience. We provide professional development opportunities, support and leadership for individuals to achieve and maintain professional recognition.	
Institute of Marine Engineering, Science & Technology (IMarEST)	International professional body and learned society for all marine professionals with a multi-disciplinary and worldwide membership, bringing together marine engineers, scientists and technologists	
Institute of Materials, Minerals and Mining (IOM3) **	The global network for the materials cycle, promoting sustainability and greater circularity in the extraction, processing, and use of natural resources.	
Institute of Water (IoW)	A professional body dedicated to supporting the careers of people in the UK water sector. Enables members to reach full potential to drive the sector forward.	
Institution of Agricultural Engineers (IAgrE)	professional body for those working in engineering, science and technology within agriculture, the environment and the land based sector	
Institution of Chemical Engineers (IChemE) **	Internationally recognised qualifying body and learned society for chemical, biochemical and process engineers	
Institution of Civil Engineers (ICE)	Membership organisation recognised for its excellence as a centre of learning, a public voice for the profession and a leading source of expertise in infrastructure policy	
Institution of Engineering and Technology (IET) **	One of the world's largest engineering institutions. We inspire, inform and influence the global engineering community to engineer a better world	
Institution of Engineering Designers (IED)	Professional membership and registration body for those working in engineering and product design	
Institution of Fire Engineers (IFE)	Global professional membership body for those in the fire sector that seek to increase their knowledge, professional recognition and understanding of fire	
Institution of Gas Engineers and Managers (IGEM) **	Supporting individuals and businesses working in the global gas industry to engineer a sustainable gas future; providing technical expertise, guidance and professional development services	
Institution of Lighting Professionals (ILP)	Professional membership body and technical learned society for those working in the lighting profession	
Institution of Structural Engineers (IStructE)	Leading professional body devoted to structural engineering with a worldwide membership. We support the profession in responding to the challenges of public safety and sustainability	
Nuclear Institute (NI)	Professional membership body for anyone that works in, studies or has a general interest in, the nuclear industry	
Permanent Way Institution (PWI)	Serves engineers working with railway infrastructure. It collects and shares technical knowledge and best practice internationally, to	

	increase skills, raise standards, and improve efficiency	
Institution of Mechanical Engineers (IMechE)**	Global institution representing 112,000 engineers. Our goal is to maximise the impact of our members and improve the world through engineering	
Institution of Railway Signal Engineers (IRSE)	Engages with a global network of railway signal and telecommunication engineers to develop and assure the highest standards of ethics, knowledge, competence, and safety in all aspects of train control	
Institution of Royal Engineers (InstRE)	A learned society that seeks to advance the art and science of military engineering by sharing experiences, best practice and emerging thinking	
Royal Academy of Engineering (RAEng)	As the national academy for engineering, we provide progressive leadership for engineering and technology, and independent expert advice to government, in the UK and beyond	
Royal Aeronautical Society (RAeS)	The learned and professional body for engineers and others across aerospace, space and aviation; dedicated to promoting the art and science of flight.	
The Royal Institution of Naval Architects (RINA)	world renowned and advances the art and science of ship, boat and yacht design, construction, maintenance, and operations	
Safety and Reliability Society (SaRS)	Professional body for safety, reliability, and risk management practitioners. We provide members with cross-industry learning, CPD and networking opportunities.	
Society of Operations Engineers (SOE)	Professional home for those working to inspect, maintain and manage the equipment and machinery which keeps people and businesses safe on a daily basis.	
The Welding Institute (TWI)	Leading independent research and technology organisation, with expertise in materials	

Appendix C

Explainer Videos Getting to net zero:
A systems approach series of short video explainers explores the complexity, urgency and opportunity of climate policy and why a whole-system approach is needed to shape the engineering contribution to sustainable societies and inclusive economies. https://nepc.raeng.org.uk/net-zero-videos

Episode	Experts	Repurpose/ develop 2023
Episode one: What is a systems approach to net zero? https://nepc.raeng.org.uk/net-zero-videos#episode-one	Dr Hayaatun Sillem CBE, Chief Executive of the Royal Academy of Engineering	
	Professor Nick Stern, Lord Stern of Brentford CH Kt FBA FRS, economist and Chair of the Grantham Research Institute on Climate Change and Environment	
Episode two: The built environment	Dervilla Mitchell CBE FREng, Deputy Chair of Arup Group and Chair of the NEPC working group on Net Zero	
	Professor Rebecca Lunn MBE FREng FRSE	

https://nepc.raeng.org.uk/net-zero-videos#episode-two	Dr Boksun Kim, University of Plymouth	
	Sir Tim Hitchens, President of Wolfson College	
	Ali Shaw, Principal Engineer at Max Fordham	
Episode three: Energy https://nepc.raeng.org.uk/net-zero-videos#episode-three	Professor Sir Jim McDonald – President of the Royal Academy of Engineering	
	Dr Joanna Clarke – Design Manager on the SPECIFIC project	
	Neha Bhagtani – Assistant Vice President, Corporate Sustainability, Tata Capital	
Episode four: Transport https://nepc.raeng.org.uk/net-zero-videos#episode-four	Professor Jillian Anable – Professor of Transport and Energy, University of Leeds	
	Professor Nick Tyler CBE FREng – Director of UCL Centre for Transport Studies, University College London	
	Professor Alejandro Restrepo – Director of URBAM, Centre for the Study of Urban and Environmental Studies at EAFIT University Medellín	
Episode five: Implementation https://nepc.raeng.org.uk/net-zero-videos#episode-five	Professor Rebecca Willis – Professor of Energy and Climate Governance, Lancaster University	
	Regina Opondo – Senior Community Principal, Kounkuey Design Initiative (KDI) International	
	Dr Elizabeth Sawin – Founder and Director of the Multisolving Institute	

15. About us

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.

TALENT & 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 & 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.*