

Northern Gas Networks

Young Innovators Council



Session 2: The future of energy, part 2 – ‘low-risk’ approaches

May 2024

Facilitated and written by Solutions for the Planet

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(YIC, S4TP, Northern Gas Networks and other)
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1. Overview of session

Background

2024 marks the fourth consecutive year of Northern Gas Networks' Young Innovators Council (YIC). The YIC continues to be the voice of young people at Northern Gas Networks (NGN). It provides young people's perspectives and Northern Gas Networks ensures these young peoples' thoughts and opinions are put at the heart of the business' decision making. Each session agenda is co-created by S4TP and Northern Gas Networks, influenced by the YIC's input on what topics they want to talk about. The aim is for meaningful and relevant engagement which provides a real opportunity for the YIC members to influence decision-making at Northern Gas Networks. At the beginning of this year, the YIC is made up of 41 young people aged 14–19 who are based across the footprint of Northern Gas Networks. Six other young people were members of the YIC this year, but have had to leave due to other commitments (mostly relating to school).

Background to the session:

Session 3 of the Young Innovators Council 2024 was a continuation of the conversations started in Session 2. In the first part in March, Northern Gas Networks and the YIC discussed the challenges and opportunities of a number of different decarbonised community scenarios. The YIC were very forthcoming on their priorities a just transition to a net zero future. However, it became clear that there are still some gaps in their knowledge that this Session 3 hoped to clarify. Northern Gas Networks also wanted to gauge the YIC's opinions on the work the organisation can and should be doing whilst waiting for key statutory decisions to be made by government.

The questions Solutions for the Planet considered whilst planning this session included:

- What is NGN's role in delivering a whole systems energy transition?
- What is the YIC's understanding of NGN's 'low-risk' initiatives such as:
 - Biomethane
 - Hydrogen blending
 - Hydrogen supply for industrial & commercial use
 - Whole Systems Modelling (to better inform local and regional energy plans)
- How can NGN stay flexible, not blocking an approach to net zero whilst not wasting customer money?
- What do the YIC feel NGN's role should be in each of these areas and which areas they think NGN should focus more effort on?

YIC 2024 Session 3: the future of energy, part 2 – ‘low-risk’ approaches

Total length: 1 hour 45 minutes

People involved: 2 S4TP facilitators, 1 S4TP observer, 5 NGN facilitators, 1 NGN witness, 1 external witness

Date and time: Wednesday 1st May, 5.15 – 7.00pm

Panel attendance: 26

Apologies: 9

Did not attend: 6

Objectives:

- To help clarify the net zero future and NGN’s potential role within it, for the YIC members.
- To understand the YIC’s perspectives on NGN’s priorities for future energy in GD3.

Prior to the session the YIC were asked to read the following introduction to the session, and watch the accompanying videos:

Whole systems approach to net zero

- Whole systems energy is a concept that looks at the full-scale energy system, including electricity, heat, and transport, to achieve a more integrated and efficient approach to energy use. In the context of achieving net zero emissions in the UK, a whole systems approach involves optimising the interactions between different energy sectors to reduce overall energy consumption and greenhouse gas emissions.
- To achieve net zero emissions in the UK, a whole systems energy approach is required which would involve transitioning to renewable energy sources such as wind, solar, and hydro power, improving energy efficiency in buildings and transportation, and integrating energy storage and smart grid technologies to better manage energy demand and supply.
- As part of the whole systems approach to achieving net zero, the UK gas industry is exploring various strategies to reduce its carbon footprint. This includes investing in low-emissions solutions such as biogas, low-carbon hydrogen, and long-term energy storage. These technologies have the potential to lower the carbon intensity of gas production, distribution and usage, making it a more sustainable option in the transition to a low-carbon energy system.
- It's important for the UK gas industry to continue innovating and adopting cleaner solutions to support the country's goal of reaching net zero emissions by 2050.”
- [What is net zero? | The Royal Society - YouTube](#)
- [Energy - getting to net zero - YouTube](#)
- [The use of biomethane \(renewable natural gas\)](#)
- [The use of hydrogen for industry](#)

Witness: Sajalu Greenall, Energy Strategy Manager, NGN

- Differences between GD2 and GD3 priorities
- Whole system collaboration
- Explanation of ‘low-risk’ options

Proposed Agenda:

Time	Activity	Lead	Room (M/B)	Timings (mins)
5:15	Welcome and introductions *Introduce Jen again	S4TP/NGN	M	5-10
5:25	Introduction to session & objectives Update from NGN (instead of ‘You said, we did’).	S4TP	M	10
5:35	Net zero clarification video	NGN	M	6
5:41	Witness: Sajalu Greenall Q+A	NGN	M	15
5:56	Activity 1: Breakout room to explore YIC’s opinions and questions around ‘low-risk’ options.	All	B	30
6:26	Plenary: feedback main points of focus from breakout rooms	All	M	15
6:41	Activity 2: Slido poll	S4TP	M	10
6:51	End			

Table 1: Proposed agenda; YIC 2024 Session 3

2. Attendees

Young Innovators Council

Amiee	Lizzie
Basmala	Maddison
Benjamin	Maryam
Dhanayus	Neve
Ellie	Orla
Emilia	Ralph
Ethan	Rosie
Francesca	Skylar
Georgii	Theo
Heather	Thomas J
Jack	Thomas M
Kelly	Toby
Lincoln	Wilhelmina

Solutions for the Planet

S4TP facilitators

Claire Fitton
Fran Isherwood

S4TP observer

Jen Baughan

Youth Insights Manager
Youth Insights Coordinator

CEO

Northern Gas Networks

NGN facilitators

Alex Brightman
Eleanor Glyn-Smith
Hollie Scott
Kati Sexton
Jenny Wilkinson

NGN witness

Sajul Greenall

Energy Futures and Net Zero Educator
Asset Risk and Strategy Analyst
Stakeholder Engagement and Project Coordinator
Customer Care Officer
Stakeholder Lead

Energy Strategy Manager

Other

External observer

Brian Matthews

Independent Stakeholder Group (ISG), NGN

3. Key discussion points

We know from the outcomes of the first session on this future of energy topic that a lot of the language around net zero and decarbonisation can often be confused. As an introduction to this session, the YIC were shown a video to help clarify some of the terminology and given a refresh on how NGN have been operating in this area up until now. They were then talked through NGN’s current thinking for how they’re going to move towards net zero through a number of ‘low-risk’ options at different scales, such as biomethane, hydrogen blending and hydrogen for industrial use. There were a handful of questions from the YIC that can be found in Appendix 1.

This detailed introduction to the session was to ensure there was enough knowledge input for the YIC, to then help understand their perspectives on NGN’s current priorities and what its role should be in decarbonisation moving forward. The breakout room provocation was:

Activity 1: breakout rooms

1. What do you think of this low-risk approach?

2. Is the focus on these low-risk approaches enough?

3. Is there anything else you think NGN should do over the next five years?

REMEMBER:

- Only 30 minutes to discuss these questions and decide on your feedback to the whole group – so please make the most of the time and ensure somebody is making notes.
- Time constraints = cameras and microphones on straight away.
- Group agreement = challenge yourselves and collaborate!

COMMUNICATION CREATIVITY PROBLEM SOLVING TEAMWORK

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Figure 1: Screenshot of breakout room key discussion questions; YIC 2024 Session 3

YIC’s thoughts on NGN’s low-risk approach to decarbonisation

The strategy of blending hydrogen and using biomethane in the existing gas grid is a great approach that minimizes disruption and makes use of already existing infrastructure, which means that there are less costs and implementing them would be faster. Blending small amounts of hydrogen is safe and would be a really effective way to begin reducing carbon emissions without extensive modifications. Similarly, injecting biomethane is a straightforward method to utilize renewable resources and decrease reliance on fossil fuels. These methods allow NGN to gradually transition to greener alternatives (thus helping reach net zero) while maintaining reliable energy supply to consumers.

As long as there isn't anything else NGN is able to do without a government decision, these will have to be the best areas to focus on; at least direct action is being taken.

The low-risk approaches may be necessary for the meantime to smoothly transition into renewable energy. However, that should not be the end goal. Hydrogen blending, biomethane and other ways of using hydrogen seem to be ways of buying time

<p>until drastic change may be needed. They allow us to continue our current energy habits without changing the system.</p>
<p>Also, pursuing these alternatives might determine that the low-risk approaches are better anyway, and perhaps hydrogen will have its role in the future.</p>
<p>NGN should continue in its role of providing statistics and information about all areas of development, because this will help with a speedier decision.</p>
<p>It is worth NGN/the UK observing how things play out abroad, e.g., trials elsewhere like The Netherlands. NGN should also continue with their own trials, and expand into testing in very populated areas. It might mean receiving more funding and therefore maybe start moving ahead a bit more into the hydrogen.</p>
<p>NGN have to be completely transparent and honest about this decision with the public, otherwise they will lose trust and it could damage the whole net zero endeavour.</p>
<p>So important to maintain focus on supply/demand, e.g., with ongoing threats of global conflicts affecting supply and cost. See it as an opportunity to kickstart new homegrown economies, even if that is in hydrogen production.</p>
<p>This "low-risk" approach is a step in the right direction for the environment. However, by only taking limited action to reduce natural gas consumption the problem is going to take a long time to be eliminated, especially considering that the population, and therefore the need for amenities like heating and cooling is constantly increasing.</p>
<p>For NGN, this approach will make a large difference, but overall a lot more needs to be done. NGN often talks about hydrogen and biomethane, however many things like heating and cooking can be done with electricity as opposed to gas, which may make a sustainable source of electricity like nuclear power more viable. On top of making the gas provided by NGN more eco-friendly, reducing the reliance on gas would have a huge benefit.</p>
<p>This low-risk approach is not enough. This is a major change towards climate inaction but ultimately doesn't solve the issue of infinite wants/ needs and finite resources. To have a greater impact we may need to have a cultural revolution as well as the implementation of advanced R&D.</p>
<p>Preparedness is so important – we're not going to have the answers for a while, but we still need to be ready for whichever way it does go. Be reactive, instead of being committed and tied to one thing.</p>
<p>NGN should put energy and focus into lobbying the government to reach net zero, however that is reached. This needs to happen faster, which is going to need pressure from all angles.</p>
<p>I believe that the low-risk approach of replacing natural gas with biomethane has many advantages and would be a possible solution to replace fossil fuels. While focusing on these approaches is worthwhile, I also believe that we need a mixed approach to fixing climate change which involves diving into many aspects of climate change and solve as many of the problems as we can: basically, look at the bigger picture instead of being precise.</p>

Table 2: Key YIC discussion; NGN's low-risk approach to decarbonisation; YIC 2024 Session 3

What else could/should NGN focus on over the next five years?

Removing carbon from the atmosphere:

- Difficult to pledge to offset, as a lot of the methods are either not doing what they're supposed to be doing or are actually carbon positive.
- NGN could be giving money to organisations that could help, rather than like taking it into their own hands.

Renewable energy partnerships: to ensure a truly sustainable supply chain for green hydrogen production, partnerships with renewable energy providers could be crucial. This would ensure that the electricity used for hydrogen production is sourced from renewable sources, which would reduce the overall carbon footprint.

NGN could consider investing in renewable energy projects and transitioning their energy portfolios away from fossil fuels. Also, if they responsibly take into account the limitations, they could be developing and deploying carbon capture and storage technologies to reduce emissions from natural gas extraction and processing.

Education:

- Raising awareness: YIC are aware that they're learning so much about this solely from their participation on this council.
- Making people care more: at this point in time, it's really difficult to care about the planet because there's so much going on.
- Spending more time on educating from the youngest age makes it possible to learn about decarbonisation and what everyone can do.
- If taught it from a younger age, there'll be more understanding by teenagerhood/early adulthood: "If you can't explain it to a 5 year old, you don't understand it enough yourself."
- Could be further incorporated into choosing subjects for those with a strong interest, e.g., at GCSE choices.
 - Although remain mandatory somehow, because otherwise risk of feeling like a chore if it's something young people are tested on.
- It should be taught in subjects like citizenship, geography, form time, world affairs and what's happening in the world and what the problems are.
- There could be possibly some sort of meeting that goes on in a place that people go to, whether it's a city centre, or utilise emails, a QR code, video content, etc.
 - People across the community will begin to think about it more, leading to a possible situation in which governments have to prioritise it to be voted for in the future.

External visitors, trips, project-based learning days can help bring the conversation alive:

- If you just tell younger generations in school shocking facts, from people other than their teachers, they're more likely to be intrigued by it and want to learn more about it.
- A dedicated day once or twice a year where young people are shown what is happening to our earth, how the way that we live impacts our surroundings, simple ways that we can help at home, like reducing our waste.
- Dedicated professional visitors who are good at talking to people and presenting this kind of information – it can be a lot more convincing.
- Bring in NGN as well, since they know what they're talking about.

It's paramount that all the information is tailored to each community audience. If you want to make people like listen, you need to focus on what they care about, whether that be dependent on age groups, geographical location, politics, etc. NGN has to target effectively.

Reach out to media channels like Sky New/BBC. Communications teams know how to reach people, and have a far bigger following than NGN.

Advocate for policies and regulations that incentivize decarbonization and carbon reduction efforts.

Table 3: Key YIC discussion; NGN's plans for GD3; YIC 2024 Session 3

During the plenary the YIC were asked for their initial thoughts on whether most decisions about the future of energy should be made at a mainly local, regional or national level. This question was then repeated in the feedback form for the session, and the responses can be viewed in Appendix 3.

Responses during the session
Ethan: "National... although the government does have obviously a grand role in the decision making, I don't see why it has to be purely left to the government as we've had the same problems for generations and yet we've had the same ideas, although we've had developments in technologies with innovating such ideas. But what is the good of those ideas if they are not acted upon? And once again, we tend to wait for disasters to happen and then try to fix them, instead of trying to prevent them."
Toby: "We were talking about making sure everyone understands what's going on with the energy and where it comes from; [e.g.,] holding meetings in the middle of town centres... mailers and leafleting would also be useful."
Orla: "It's important for it to be national and then be broken down. For people to really understand it, I think it has to be at a local level because then it's really specific and direct... when you talk about the UK it can feel a bit distant because it's not really zoomed in to you specifically. But when it's about your area, you can visualise that and you think, oh, these changes are affecting me."
Theo: "Each region has its different needs. Especially when you look at levelling up schemes for the North, I think it's really important to make sure that it's fair, and when you do things nationally, I feel like different regions and their needs are not taken into account. Also with a national system sometimes the money leaks out and it's not as well spent, [e.g.,] if I'm an engineer in West Yorkshire working on a new gas scheme, I'm going to know about what my area needs and I'm going to help apply that."
Fran: Perhaps you need to trial national-based decisions because it's those decisions that historically affect the whole country and cause big changes. But then once the decisions have been made, make it more local deciding what you're going to do with that. So it does the right things for the area but manages to affect the entire country rather than just small pockets."
Maryam: "Locally, contact the community leaders... it's the person who manages the community centre that knows their community. It's the person who's been living there for 50 odd years, who knows everyone and everything going on, who's going to know what that community needs. You could definitely have environmental training specifically for

people who want to go into the field of science or who were studying science. The more people know, word of mouth can spread a lot quicker.”

Amy: “I think that it should be held on a local scale and that we should contact local MPs who will be able to connect with the community much better than someone from the government would, they would know the necessities for their local area that they're supposed to take responsibility for. Bigger organisations and the government should talk to the MPs, who can then inform younger people or just people in their local area.”

Table 4: Key YIC discussion; scale of decision making; YIC 2024 Session 3

A member of the YIC then posed the question “Would putting the money into education, into helping people understand the issue, help the actual problem of net zero more than direct action to improve the amount of carbon Northern Gas Networks releases as day-to-day operations? Is it better to spend £1,000,000 teaching people how to pollute less, or just spend £1,000,000 on things that will make you pollute less?” Again, there were some responses during the plenary, and it was put to the YIC again in the session feedback form.

Responses during the session

Georgii: “I think investing money into education *might seem* like a worse off option right now, but it would eventually snowball and you're essentially marketing the idea of net zero to young people, to people with ideas, to the age bracket that is the most motivated to do something about it. So I think more money should be invested into education right now as it currently stands.”

Fran: “Education is quite important. We mentioned in the first session that there's actually a lot of things that can't be done because of technology limitations. Therefore, education is probably one of the best ways to get the government to speed up with making this decision, because the more people put pressure on them to do something, the more they're likely to do it; because it will benefit them and they're more likely to get voted and stay in Parliament.”

Amy: “You mentioned about spending £1,000,000 for education, when the government could just tell educational places to do it for free as part of the curriculum. There have been plenty of projects before where the government have invested lots of money into education for students.”

Dhanayus: “Once [the government] see that something works they seem to take it on, [i.e.,] the digitalization of government services. I think if they can see that gas can be run locally with lower carbon, they might stand behind it, compared to right right now where they could just delay and delay and delay.”

Maryam: “There definitely needs to be more public awareness about what is actually going on behind the scenes [especially in energy companies], because a lot of times people think that they know what's going on and that leads to really misconstrued stereotypes... The public does need to know, especially if it's going to have an effect on them. While education in schools is a great idea, it's also important to get around the community because not everyone's in school anymore. If I wasn't part of this council, I would not know what was going on. I thought for the longest time that all energy companies must not care about the environment or what they're doing to it.”

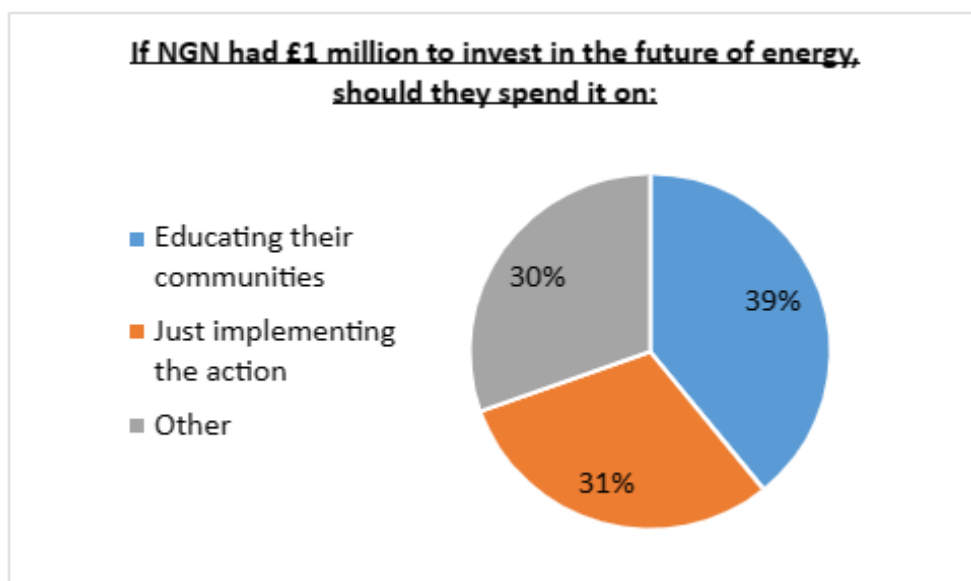
Table 5: Key YIC discussion; education or action; YIC 2024 Session 3

4. Key Reflections

Each breakout room was invited to feed back the key recommendations or focus points of the conversations from their groups.

➤ **A thorough look at education:**

- How schools could get external visitors from different companies or institutions to showcase and inform the students.
- Cover the main emissions and shock people with surprising factors that can contribute to climate change, (e.g., refrigeration as a major emitter)
- To get children intrigued and invested, which will make them want to learn more.
- Mandatory education making people aware about the key conversations within the topic of future energy from a young age, to help encourage behavioural change, i.e., walking/cycling short distances as opposed to driving a car, growing your own food, etc. instead of creating a reliance and assumption that net zero will be achieved for you and without you.
- QR codes (on energy hardware, for example) that directs people to centralised, reliable information about the topic.
- Information across news channels, e.g., morning radio, BBC news – reaches people without social media.



'Other'
A combination of both
Both
Both are equally as important
Both. The most important thing is action, but we need to all understand what is going on as well.
Some on both.
Split between education and funding others specialised in this field instead of developing new technology and similar.

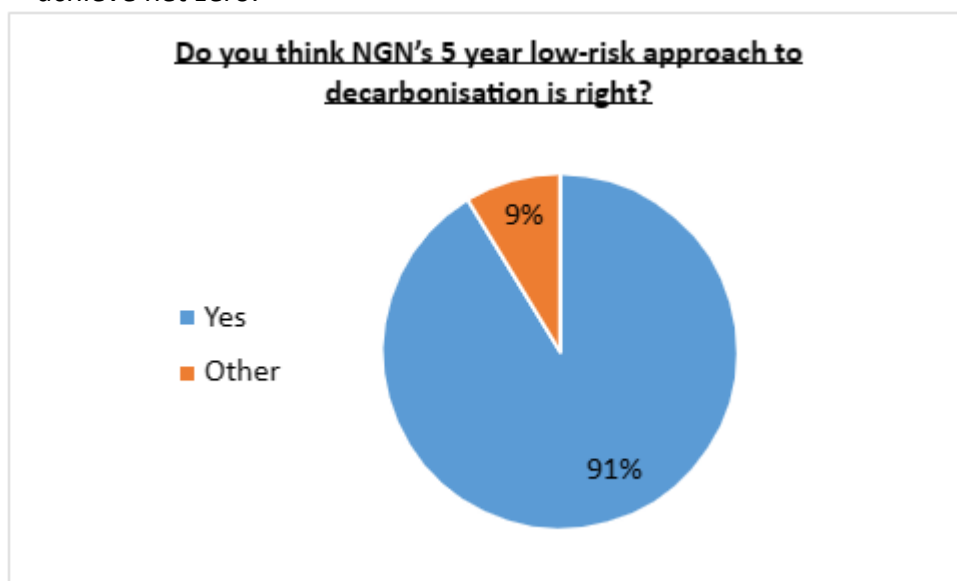
A combination of both, we already know about climate change, we have done for decades now, surely we need to stop talking and do it before other deadlines are missed?

➤ **Appropriate use of investment of time, money and expertise:**

- Collaboration with expert organisations: NGN should ‘stick to what they know and can do’.
 - E.g., NGN given £1million by Ofgem to invest in electric vehicles but didn’t fulfil the target so had to return the money.
 - In this example, could NGN instead invest that money in other companies with more specific expertise that are creating vehicles which would be able to suit NGN’s needs, to achieve net zero much quicker.
- The YIC reiterated that a solution of any kind is invaluable and could snowball into something bigger. The exact answers don’t have to be found now, but this progress should still be pushed for because the ultimate goal must remain net zero as soon as possible.
 - E.g., collaborate with universities on innovation.

➤ **NGN’s focus on low-risk approaches:**

- The YIC clearly acknowledge this is a pragmatic approach, because it ensures all avenues continue to be explored and energy provision isn’t halted.
- Having said that, one YIC member voiced the view that ‘it slightly feels like a let down from NGN’ – from their perspective, hearing about all kinds of innovative ideas which are then not followed through on (for whatever reason) is ‘a massive let down’.
- Hydrogen: the YIC understand that there are ongoing challenges with hydrogen as the main source of energy for the future, but see that there’ll be different sorts of battles with different stakeholders around any new innovation. This shouldn’t deter NGN from persevering with new technologies that help to achieve net zero.



'Other'

It seems to be a bit slow and quite a bit of waiting around for other countries to do something or the government to announce something and if initiative isn't taken, the goal may not be achievable.

Some good ideas, but nothing certain or set in stone makes their approach feel uncertain or confusing.

➤ **NGN's role moving forward:**

- A number of the YIC expressed strongly that NGN's responsibility doesn't and shouldn't change despite waiting on a government decision, and regardless of what that decision is. As one member put it, they want to see NGN as "the ones that take the first steps forward and they lead by example and try and show other companies what we should be doing".
- They'd like to see NGN at the forefront of making the necessary change happen across the industry through education, innovation and infrastructure, and also through keeping the pressure on decision makers.
- The young people reiterated throughout the session that what we need as a country is to be able to continue functioning, whilst also reinvesting and creating the design needed for net zero.
- There was some conversation here around the possible exploration of growing our own energy, because consistent and just production and energy supply is also very important to the YIC.

5. Conclusion

This session was a particularly dynamic response from the YIC to NGN's key questions. Most of the young people did understand that taking a pragmatic approach until key governmental energy strategies are decided is reasonable. Having said that, they also made it very clear that NGN has a key role in driving forward the net zero agenda by partnering with other organisations around research and development of new technologies, educating around net zero, continuing to develop low carbon alternatives to natural gas and leading by example in the move towards net zero. Many of the YIC felt that although many decisions are and should be made nationally, a local approach to energy production would be a more just transition that would take into account local needs and local opportunities.

The YIC were clear that NGN should not give up or defer innovation and should in fact lead other organisations in a whole systems approach to net zero whilst taking a pragmatic approach to decarbonisation in the very near future. This should not be a long-term plan.

6. Appendices

Appendix 1: Questions asked to Sajalu Greenall/NGN by the YIC

Thomas M's question: "What are some of the medium/high-risk strategies?"
Saj's response: <ul style="list-style-type: none">• NGN have done the exercise on what low-risk options looks like versus high-risk options, but because these conversations are quite commercial in nature, are not able to disclose that with the YIC just yet.• NGN does look at all different possible futures, look at different risks and what that risk means for them; what the risk appetite is for the company.
Emilia's question: "Why is it that other countries are making steps forward but we aren't, delaying it until 2026, which is when we're waiting on the decision from our government about hydrogen. They should surely know that it therefore will affect our target of 2050. Is it just a matter of expense or something else?"
Saj's response: <ul style="list-style-type: none">• Not aware that any government has taken a decision to definitely support hydrogen for heat; a lot of governments are in the evidence gathering space.• E.g., The Netherlands have done village trial in a place called Locum. The UK has a trial Fife, Scotland that's currently in the pipeline.• The government is taking a thorough approach in terms of trying to decide and weigh up the options, because we need to understand A) if we can produce hydrogen cheaply, and B) if we can produce it at scale.• Affordability: we are talking £ trillions, which essentially gets transferred back to the taxpayers and the billpayers whether directly or indirectly.• Gathering the right evidence and weighing up all the information before making a decision: frustrating, but we can't make decisions in haste either. We've got to have that pragmatic approach.
Kelly's question: "Is using hydrogen and biomethane more expensive than fossil fuel?"
NGN's response: <ul style="list-style-type: none">• Hydrogen and Biomethane are more expensive at the moment, as is often then case with new technologies. Cost is something that is being worked on. Kelly's response: "How is it being worked on, strategies-wise? Is the production of hydrogen and biomethane aiming to become more efficient with less waste?" NGN's further response: <ul style="list-style-type: none">• Hydrogen is a huge waste product in a lot of industry, so that is being looked into.• Hydrogen production facilities are getting government funding, e.g., a company has just been awarded funding for North Tyneside, there's one being built in Tees also.

Appendix 2: Work shared by absent YIC members [that has not already been incorporated into the body of this report].

Anish

“Some possible ways of implementing hydrogen and biomethane:

- Hybrid Home Heating Systems: Implement hydrogen-ready boilers that can operate on both hydrogen and natural gas to allow flexibility and ease in transition.
- Local Hydrogen Production Hubs: Establish small, local electrolysis stations using renewable energy to minimize transport and engage communities.
- Public Transport Conversion: Collaborate with local governments to convert public buses and vehicles to hydrogen fuel cells to reduce urban carbon emissions.
- Seasonal Hydrogen Storage: Utilize excess renewable power for hydrogen production, storing it for peak energy demand periods.
- Community Biomethane Facilities: Promote small-scale anaerobic digestion in rural communities to turn waste into energy locally.
- Industrial Biomethane Use: Market biomethane as a sustainable alternative for high energy-consuming industries.
- Marketing and Incentives: Develop a green credential system and provide incentives for customers adopting green technologies.
- Educational and Advocacy Efforts: Launch educational campaigns on the benefits of hydrogen and biomethane and advocate for supportive energy policies.

What else could NGN consider:

- Leak Detection Technology: As hydrogen has different properties than natural gas, such as being lighter and being more flammable, NGN could consider investing in new technologies for leak detection to ensure safety and efficiency.
- Carbon Capture and Utilization: While transitioning, NGN could explore technologies that not only capture CO2 emissions but also find commercial uses for the captured carbon, adding another layer of sustainability and also helps to reach net zero goals.
- Research and Development: Engage in R&D to improve the efficiency of both hydrogen fuel cells and the anaerobic digestion processes. This could lead to greater efficiency and so it might mean the processes are more sustainable, helping to reach net zero.”

Wilhelmina

"I was invested in the key points made but feel as though a significant point from one of the pre-work videos was missed. To summarise, the top 1-10% of energy consumers contribute the most to carbon emissions and it makes sense to me to tackle this demographic as well as looking at how to reduce the emissions of the general public. This has led me down a rather socialism, politics-heavy route, and I'm not too sure how we would accomplish reducing these outputs from our position. Here are my notes:

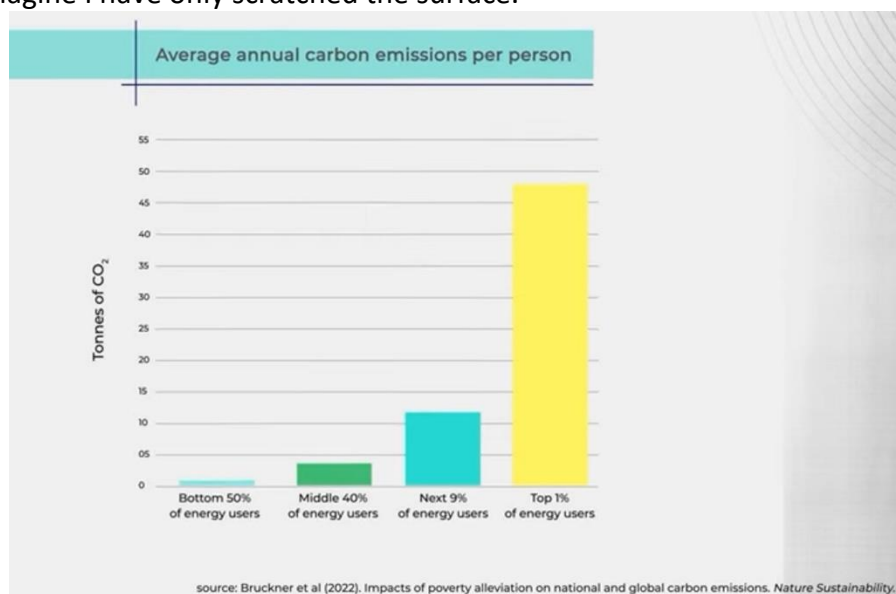
Socialism-esque notes

- Most of human activity releases greenhouse gases but the top 10% is most concerning.
- OXFAM released an article that links the two massive issues of poverty and inequality to our current climate disaster.
- How do we reduce the emissions of the 'super-rich'?
- OXFAM called for governments to up the tax on millionaires/billionaires and use it to tackle climate and inequality costs.
- This extra tax on the 'super-rich' would solve many issues.
- A major factor that slows the progress to achieving net zero is the lack of funds and this could be the exact solution.
- <https://www.oxfam.org/en/press-releases/richest-1-emit-much-planet-heating-pollution-two-thirds-humanity>
- <https://www.oxfam.org.uk/media/press-releases/richest-1-emit-as-much-planet-heating-pollution-as-two-thirds-of-humanity-oxfam/>

Other general notes

- Government decisions are still very prominent in this battle.
- Education is important as ignorance is still widespread.
- People seem not to care - motivation is important

I am also on the Durham Youth Council and may discuss it with them as well, and assume if this is an issue you feel is relevant then I am sure the DYC would be happy to help should we take any action. [Below] is the screenshot that encouraged me to research this further, though I imagine I have only scratched the surface."



1. Transportation: Hydrogen fuel can be used in fuel cell electric vehicles (FCEVs) to power cars, buses, trucks, trains, and even ships and aircraft. FCEVs offer long driving ranges and fast refueling times, making them suitable for various transportation needs. Hydrogen fuel cell technology provides a zero-emission alternative to conventional internal combustion engines, reducing greenhouse gas emissions and air pollution.
2. Energy Storage: Hydrogen can serve as a form of energy storage, helping to balance fluctuations in renewable energy generation, such as wind and solar power. Excess electricity from renewable sources can be used to produce hydrogen through electrolysis, and the hydrogen can be stored until needed. It can then be converted back into electricity or used directly in fuel cells to meet demand during periods of low renewable energy output.
3. Industrial Processes: Hydrogen is widely used in various industrial processes, including petroleum refining, ammonia production for fertilizers, and methanol production. Switching to hydrogen as a feedstock or energy source in these processes can reduce greenhouse gas emissions and dependence on fossil fuels.
4. Heat and Power Generation: Hydrogen can be used in fuel cells to generate heat and electricity for residential, commercial, and industrial applications. Fuel cell combined heat and power (CHP) systems can provide reliable and efficient energy services while reducing emissions compared to conventional combustion-based technologies.
5. Grid Balancing: Hydrogen can be injected into the natural gas grid or stored in underground caverns to provide grid balancing services. By storing excess renewable energy as hydrogen during periods of low demand and releasing it when demand is high, hydrogen can help stabilize the grid and support the integration of variable renewable energy sources.
6. Chemical Industry: Hydrogen is a versatile chemical feedstock used in various industrial processes, including the production of ammonia, methanol, and hydrocarbons. Green hydrogen produced from renewable sources can help decarbonize the chemical industry and reduce its reliance on fossil fuels.
7. Residential and Commercial Use: Hydrogen can be used for heating, cooking, and other residential and commercial applications. Hydrogen-powered appliances, such as boilers, stoves, and fuel cells, offer a clean and efficient alternative to natural gas or electricity, particularly in areas with limited access to renewable energy sources.

1. Biomass Gasification: Biomass, such as agricultural residues or organic waste, can be converted into hydrogen through gasification processes. This method offers a renewable and carbon-neutral way to produce hydrogen, as the carbon dioxide released during gasification is offset by the carbon dioxide absorbed by the biomass during its growth.

In 2022, the General Inspectorate of Finance created a stylized visualization outlining the projected cost of achieving net zero emissions, factoring in potential positive 'indirect effects' on productivity due to the transition. This would entail an added debt of approximately 10% of GDP by 2040 and 15% of GDP by 2050.

SESSION 3 PRE WORK

1. Transportation Fuel: Biomethane can be used as a clean and renewable fuel for vehicles, including cars, buses, trucks, and even trains. When used in compressed natural gas (CNG) or liquefied natural gas (LNG) vehicles, it significantly reduces emissions of greenhouse gases, particulate matter, and other pollutants compared to diesel or gasoline.
2. Heat and Power Generation: Biomethane can be used for heating and electricity generation in homes, businesses, and industrial settings. It can be burned in boilers or combined heat and power (CHP) systems to produce both heat and electricity, providing a renewable and low-carbon energy source.
3. Grid Injection: Biomethane can be injected into the natural gas grid, blending seamlessly with conventional natural gas supplies. This allows biomethane to reach a wide range of consumers, including residential, commercial, and industrial users, without requiring significant changes to existing infrastructure.
4. Energy Storage: Biomethane can be stored for later use, offering a reliable energy storage solution. This is particularly useful for balancing fluctuations in renewable energy generation, such as wind and solar power, by providing a flexible and dispatchable source of energy.
5. Waste Management: Biomethane production helps divert organic waste from landfills, reducing methane emissions and odors associated with decomposing waste. Anaerobic digestion of organic waste not only produces biomethane but also generates digestate, a nutrient-rich byproduct that can be used as fertilizer for agriculture.
6. Rural Development: Biomethane production can contribute to rural economic development by creating jobs in agriculture, waste management, and renewable energy sectors. It offers new opportunities for farmers, waste management facilities, and local communities to participate in the renewable energy transition.

Biomethane, also known as renewable natural gas (RNG) or upgraded biogas, is a type of biogas produced from organic matter such as agricultural waste, food waste, sewage, or energy crops through a process called anaerobic digestion. During anaerobic digestion, microorganisms break down the organic matter in the absence of oxygen, producing biogas, which primarily consists of methane (CH₄) and carbon dioxide (CO₂), along with trace amounts of other gases. Biomethane is then produced by upgrading the biogas to remove impurities such as CO₂, water vapor, hydrogen sulfide (H₂S), and siloxanes, resulting in a gas that is nearly pure methane. This purified methane can then be injected into the natural gas grid, used as a transportation fuel, or utilized for heating and electricity generation. Biomethane is considered a renewable energy source because the organic matter used to produce it is derived from biomass, which can be continuously replenished through natural processes. It is a sustainable alternative to fossil fuels and helps reduce greenhouse gas emissions, as the carbon dioxide released during its combustion is offset by the carbon dioxide captured by the biomass during its growth.

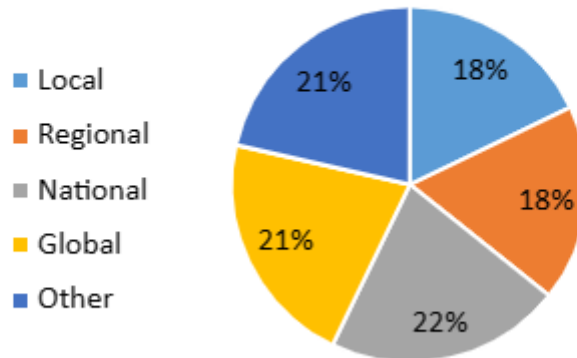
Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun's activity or large volcanic eruptions. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil, and gas, which releases greenhouse gases. Burning fossil fuels gives off heat, and greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun's heat and raising temperatures. The main greenhouse gases that are causing climate change include carbon dioxide and methane. These come from using gasoline for driving a car or coal for heating a building, for example. Clearing land and cutting down forests can also release carbon dioxide. Agriculture, oil and gas operations are major sources of methane emissions. Energy, industry, transport, buildings, agriculture and land use are among the main sectors causing greenhouse gases.

- Climate change is a pressing issue that refers to long-term shifts in temperatures and weather patterns.
- While some shifts can occur naturally due to factors like changes in the sun's activity or volcanic eruptions, human activities have been the primary driver of climate change since the 1800s.
- The burning of fossil fuels such as coal, oil, and gas has significantly contributed to the acceleration of climate change.
- Fossil fuel combustion produces greenhouse gas emissions that act as a barrier, trapping the sun's heat within the Earth's atmosphere and leading to a rise in temperatures.
- The two main greenhouse gases responsible for climate change are carbon dioxide and methane.
- Sources of carbon dioxide emissions include activities like driving a car using gasoline, heating buildings with coal, and deforestation.
- Major sources of methane emissions stem from sectors like agriculture, oil and gas operations.
- Various sectors including energy, industry, transport, buildings, agriculture, and land use play significant roles in the emission of greenhouse gases, thereby contributing to climate change.

Appendix 3: YIC 2024 Session 3 feedback form responses pertinent to the session topic.

Is there anything else you think NGN should consider doing as part of their approach to supporting energy decarbonisation?
Focus on education of young people.
Make energy decarbonisation a mandatory thing for construction; for example, putting solar panels on every house and building that is made.
Developing and deploying carbon capture and storage technologies to reduce emissions from natural gas extraction and processing.
Mainly educating people on it like we spoke about in the session, to help change attitudes and make sure people know what they are doing to decarbonise.
Educating the youth and public on the topic, as well as consumerism.
Renewable energy for vehicles.
More outreach and work with large companies to help their buildings and lorries from using so much energy.
Educating the public by simplifying everything they're doing, making it easier to understand as well as targeting different approaches to different age groups, areas, political parties, communities, etc.
Lobbying local MPs for faster hydrogen take up towards net zero.
Try advertising more.
I hope that NGN is going to collaborate with other major gas/energy companies to do research and to create different plans for reacting to the 2026 government decision.
Support smaller firms as well.
Working with universities and possibly PhD students in the industry with their research to see if anything can be sped up that way or new ideas, instead of the one goal of hydrogen, in case the government decides to not go down that route.
Supporting a reforestation programme or carbon capture programme directly to offset emissions.
Be clear about their intentions, have time stamps to motivate them to fulfil their goals.
Further education or activism? It's difficult to get people to care but it's important, I believe.
Continuing to support new innovation while awaiting more government decisions.
I think they need to educate the community more on decarbonisation and getting to Net Zero before the decision is made by the government in 2026 so then there is less backlash and negative opinions arising when NGN is able to make big changes to help the Net Zero target.
Consider production and transport of renewable energy so it is not something majorly monopolised by a different power like the situation of the fuel crisis two years ago due to Russia.

At what level should most decisions about the future of energy be made?



'Other'

- Countries with a high amount of gas emissions.
- Local for the 'how' of the change, e.g., where decisions are allocated, transport.
- National for the 'what' of the change, e.g., heat pumps, solar cells.
- Local to target certain area's needs, regional for the general environment knowledge, national for setting targets and getting most funding
- A combination: overall what to do should be made nationally but then how it is put into place should be done locally.
- National level, with local schemes.
- Both local and national.

Please explain your answer

Local	People know what's best for their local area as they are the ones that are in it. It presents problems like a North/South divide from being created, which could stem from all the decisions being made in London.
	I think it should work from a bottom-up approach where the local community lead the change and it's actioned and refined regionally and nationally.
	Small changes are most effective, especially if lots of these local schemes are put into place.
	Locals will benefit people more depending on their needs
	Leeds uses a different amount of energy than a small village; energy needs are different.
Regional	Most decisions should be made on a regional level as the UK is very diverse in its various demands and supplies, and by doing it regionally, it is easier to ensure no one is left behind, and it can be adapted to that specific area. Smaller, even more specific decisions should be made locally, but general/wider decisions should be made on a regional scale.

	<p>Some approaches may work better for some regions than others, but all should aim to move away from fossil fuels to lower carbon sources.</p> <p>Different regions have different needs and available resources which should be considered. However, for uniformity and efficiency it should be broader areas than local.</p> <p>I think regional because decisions about the future of energy will be different in different areas of the country, but making them local I feel would be hard for companies like NGN to keep track of who is doing what.</p> <p>Provides a more stable decision-making process and allows easy and quick completion of projects.</p>
National	<p>Who would invest locally? For what benefit? These Business Studies decisions are known as Macro decision, everybody wants carbon free or guilt free fuel, but no one locally wants to pay for it and suppliers can't market it at a premium to customers because of the cost increase given the cost-of-living issues at the moment.</p> <p>If the nation decides how quickly they want it, it might help them get more support.</p> <p>I believe the whole country/world has a say in what happens with it and what steps we should take for a cleaner future.</p> <p>I think this should be done at a national level in order to make sure that no one is left out and all regions/communities receive the specific help they need.</p> <p>National funding and decision-making trickles down from regional then to local.</p> <p>To reach a zero-carbon emission goal the decision can't be left to one small group or multiple small groups as there will be contradictory opinions and ideas, but it needs to be discussed and researched at a national level for it to be fully accepted by the public and they need to have a say too.</p>
A combination of local, regional and national	<p>National decisions will have a greater overall effect. However the local council will have a better idea of what is needed in the area so can make a more informed decision about how to act.</p> <p>It's important for people to have a say in their community but the climate is too important to leave solely in the hands of local opinion, so national decisions are also important because they come from experts in the field.</p> <p>A mixture of all of them for the different benefits of the power and knowledge of the different communities and landscapes.</p> <p>National should focus on methods, whereas local and regional should focus on implementing those methods with the people and communities.</p> <p>National level ensures consistent policies across the county, while local schemes allow people to feel involved and aware of the decisions.</p>

Global	I believe that to convert from non-renewable resources to renewable resources we need the support and collaboration from countries across the globe to foster innovation from talented scientists to develop and expand on existing technologies.
Countries with a high amount of gas emissions	Because every country that has a high carbon footprint could decrease it.

Please briefly explain what climate change education you have had in school:	
	My education on climate change is from the GCSE specs of Geography, Biology and Chemistry, as well as being part of my schools eco club. These focus mostly on the causes, both natural and man-made, and some of what can be done to reduce it.
	In the past few years I've had quite a lot. I might have had in the past as well, and not cared enough to remember. My current school focuses on engineering, so the environment is an important topic. We talk a lot about it in Values lessons and also had a climate expert come in from Leeds Uni once.
	What greenhouse gases and a carbon footprint are.
	Mostly during science lessons when learning about climate change and renewable energy sources.
	Very little in PSHE, mainly just learning about what it is and how it will affect us. In GCSE Geography there is a topic on it too, but it mainly focuses on how other countries suffer from it.
	GCSE and A Level Geography: greenhouse gasses, decarbonising, carbon footprints GCSE Biology: Ozone layer
	I've learnt about mitigation and adaptation strategies surrounding climate change.
	Types of energy clean renewable and the effects.
	A level Geography, very factual knowledge on how climate change effects those in LICs and MICs.
	I have had no mandatory education, but I attended an optional group which later stopped because out of the 1800 people in my school 5 people attended including the teacher organising it. There was a very small section of energy in Physics in Year 9, however only top set got taught that.
	A lot, as part of Geography, Business Studies, Media, plus Chris Packham visited HTCS in 2023 and discussed the need to get on with things, rather than keep kicking the can down to road for future generations - for instance like my children.
	We have had it in Geography, about the way pollution can effect climate change and what steps we should take.
	We've been taught about the causes of climate change and how some people are trying to reduce the amount they're contributing.

Most of the climate change information I received at school was from Biology and Geography lessons. Our teachers told us about global warming, the ozone layer and pollution in general. In Physics we also discussed green energy and nuclear energy.
Greenhouse effect but also the effects on biodiversity.
Hydrocarbons and the ozone in chemistry Some in GCSE Geography (cannot remember what).
AQA Combined Science topics B7 - climate change, global warming C9 - Chemistry of the atmosphere, greenhouse effect and gases P1 - Energy, Renewable/Non renewable, efficiency AQA Geography Unit 1A - Climate change, evidence, causes, and impacts Unit 2C Energy, sustainable supply, global demand Apart from those subjects there is little else taught, even from PSRE/PSHE/PD.
In Geography, get an awareness of the situation, in Biology, good awareness and education of it, but want a bigger picture and how it will affect us in the future.
The topic has been briefly touched upon in various subjects such as Personal Development, Biology, Chemistry, and Geography, but there has never been anything too specific mentioned, it's all just part of a spec.
I do A-level Geography, we explore it in detail in addition to exploring energy dilemmas.
1 hour lessons a few times each school term through primary and secondary school as well as briefly touching upon it in some GCSE subjects.
The climate change information we have been taught in school is very limited, going into the YIC I had no idea the scale of the implications it is having and the mass change that is needed and the thought process behind it. At school we are taught about fossil fuels and what they do to the environment but not to an extent where one understands the immense difficulties the planet is now facing.
Honestly not much, there is the little topic on why ozone keeps reducing in Chemistry, discussion on formation of earth and it's atmosphere in Biology and general idea of how ozone reflects sunlight while carbon dioxide absorbs them in Geography.

Which subjects do you cover climate change in at school?
Geography, chemistry, biology and PHSE
Physics, Engineering, and Values.
Geography and science
Science, Engineering, English, computer science.
Geography, Chemistry
Geography and biology
Geography
geography and science
Geography
Physics, Year 9 top set (I don't know about geography)
Geography
science
Biology, chemistry, physics, geography
Geography Biology chemistry RE
Chemistry, geography
Geography, Science - all have a topic on Energy/Climate change

Geography, chemistry, biology
Personal Development, Biology, Chemistry, and Geography,
Geography
Used to cover in Biology, Chemistry, Philosophy and Ethics, PSHE.
Physics and geography mainly then briefly in chemistry and biology.
Geography, chemistry, biology

How confident do you feel in your knowledge about climate change, on a scale of 0 to 10?	7.56
How confident do you feel in your knowledge about net zero, on a scale of 0 to 10?	6.43

Appendix 4: Remaining YIC 2024 Session 3 feedback form responses

The YIC were asked to say how far they agreed with the following statements about Session 2, on a scale from 0 = completely disagree to 10 = completely agree:

Statement	Average score	Average score previous Session 2
In Session 3, NGN gave me enough clear information for me to understand the topic and give my informed responses.	7.45	7.68
In this session, NGN was honest about its future choices and what my engagement will influence.	7.91	7.68
I felt that I had the opportunity to contribute to the discussions in this session.	7.81	8.24
I felt that my ideas were listened to.	7.95	8.52
It is clear to me how my ideas and insights are used to change NGN's business plans.	7.45	7

Please write here any ideas you've had that you didn't get a chance to say during the session.

I do think the big unknown is whether Labour will be keen to reverse climate decisions (especially the Redcar trial) that the Tories have let slip. Labour will want to prove they are different and care, compared to the Tories, and hopefully sponsor less greenwashing and more future proofing action.

My school do weekly things involving 7 steps one for every day, they can be on reducing energy, reducing waste, reducing emissions and people have actually been doing it. I think it would be a good idea to get more people involved with a simple 7 steps every few weeks to help with net zero goals and decarbonising.

In terms of sharing information to increase awareness about decarbonisation, if the target audience are teens and children, I'd advise use of social media platforms or music and gaming platforms which are areas frequently visited by people on the internet.

[Extracted May 2024, 23 respondents]