

CRITICAL PATHS

Powering a new generation

Resources to support the curriculum and bring examples from the nuclear industry into the classroom for KS3 (11-14 year olds). Available from www.CriticalPathsUK.com.

Useful Links for Students and Teachers

A collection of web links to information about the nuclear industry and careers guidance.

We proudly support:



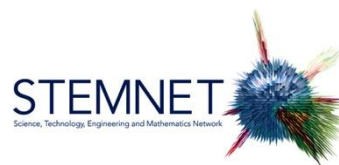
lightyear foundation

Find out more about the charity by visiting its website: www.lightyearfoundation.org

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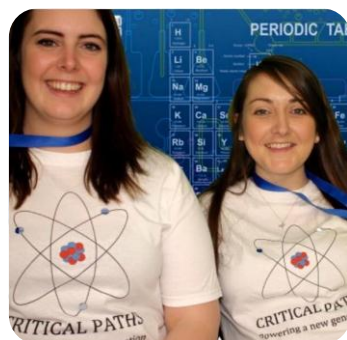
What is *Critical Paths*?

Critical Paths is a set of resources that was created by ten graduates who have recently entered the UK's nuclear industry and founded *inNUvate Ltd*. We all believe that nuclear power (alongside renewable energy) must play an important role in providing us with a secure energy supply in the future, and in fighting climate change. The industry needs more enthusiastic young people to help generate this energy and solve its unique challenges. Through the resources that make up *Critical Paths*, we hope to show that the nuclear industry can offer an exciting, rewarding and long-term career to anyone! We hope to help people understand the nuclear industry better and to point out some common misconceptions.

Hopefully you find our resources helpful. They are all available at www.CriticalPathsUK.com. If you use our resources and would like to offer any feedback, or have any questions, we would love to hear from you. Please get in touch.



popatomic.org



Together, we can power a new generation.

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Want to find out more...?

There is a large amount of information about science, engineering and the nuclear industry available on the internet. To help you start your search we have produced this list of useful website links for your reference. This document is broken down into the following sections:

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1. Nuclear Industry Information

If you are interested in learning more about the nuclear industry, the following websites make a great starting point.

Nuclear Industry Overview

Critical Paths

<http://www.criticalpathsuk.com/>

Our website is where you can find our electronic resources for use in your school. It also has information about our sponsor companies and their employees. You can also find us on Facebook ([CriticalPathsUK](#)), Twitter ([@CriticalPathsUK](#)) and [LinkedIn](#)!

Map of UK nuclear sites

<http://www.criticalpathsuk.com/ukmap>

Not sure if there is a nuclear site near you? Check this map to find out!

Re:Generation

<http://regennuclear.com/>

A campaign providing facts about the nuclear industry in support of a clean energy future.

Nuclear Myths

<http://nuclearmyths.org/myths/>

This website dispels some common myths and misconceptions about the nuclear industry.

Nuclear Basics

<http://www.world-nuclear.org/Nuclear-Basics/>

The World Nuclear Association presents lots of good information on nuclear, from how a power station works, to the many other uses for nuclear technology. Check out its Information Library.

<http://www.world-nuclear.org/Information-Library/>

UK Nuclear Power

<http://www.world-nuclear.org/info/Country-Profiles/Countries-T-Z/United-Kingdom/>

The World Nuclear Association provides a very detailed write up of the UK's nuclear industry.

Nuclear Industry Association

<http://www.niauk.org>

The UK's civil nuclear trade association website offers some interesting facts on its website. Includes some helpful infographics and posters. <http://www.niauk.org/facts-and-information-for-nuclear-energy>

World Nuclear News

<http://www.world-nuclear-news.org>

A good place to find up to date information on the global nuclear industry.

Energy for Humanity

<http://energyforhumanity.org/>

An independent environmentalist website. Proving that environmentalists can (and do) support nuclear power! Also see <http://weloveelectricity.org/>.

RadTown

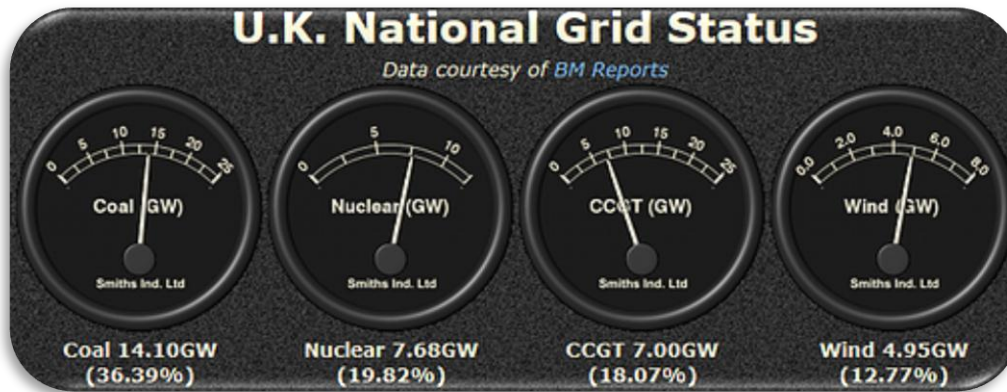
<http://www3.epa.gov/radtown/index.html>

This US website presents lots of information about radiation – where it is found in everyday life and how it is controlled. It includes games, puzzles and radiation related activities/lessons for use in the classroom. Definitely worth a look!

UK Energy Generation and Demand

GridWatch - <http://www.gridwatch.templar.co.uk/>

This website lets you see where the UK is getting its electricity from at any point and lets you see the variation in electricity generation over the course of the day. It can be interesting to look at how much is being generated from fossil fuels vs renewables or nuclear.



Screenshot from GridWatch website correct on 8 April 2015

GridCarbon (App) <https://itunes.apple.com/gb/app/gridcarbon/id346832866?mt=8>

This free app for your iOS is similar to the GridWatch website (above), but allows you to quickly check things wherever you are. Why not download it and see how things change during the day?

Nuclear Waste

The Nuclear Decommissioning Authority (NDA) have made a great, easy to understand document which gives an overview of nuclear waste in the UK – where it comes from and what happens to it.

<https://www.nda.gov.uk/ukinventory/wp-content/uploads/sites/2/2014/01/Understanding-activities-that-produce-radioactive-wastes-in-the-UK.pdf>

Terminology

The nuclear industry is often guilty of using technical terminology and acronyms in its communications.

Burges Salmon LLP has produced a glossary of nuclear terms which should help you to find the meanings of any terms which you don't understand. Google is always a good start too!

http://www.burges-salmon.com/sectors/energy_and_utilities/nuclear/publications/burges_salmon_glossary_of_nuclear_terms_july_2014.pdf

Our Supporters

We would like to thank the following organisations for their support of *Critical Paths*.

The University of Manchester's Dalton Nuclear Institute - <http://www.manchester.ac.uk/dalton>

The University of Manchester's Dalton Nuclear Institute delivers the largest and most connected academic nuclear research capability in the UK and is a leading centre for higher learning in nuclear science and engineering. It is based in Manchester but also has a research facility in West Cumbria.



National Nuclear Laboratory - <http://www.nnl.co.uk/>

NNL plays a key role in the UK and global nuclear industry, providing independent advice to the UK Government and working with other National Laboratories around the world. It delivers a full range of research and technology to support all aspects of the nuclear industry.



DBD Ltd. - <http://www.dbdlimited.com/>

DBD is a UK-Based, independent enterprise providing innovative solutions to complex management, technical and engineering issues, focused on highly regulated industries.



Sellafield Ltd. - <http://www.sellafieldsites.com/>

Sellafield Ltd is the company responsible for safely delivering decommissioning, reprocessing and nuclear waste management activities on behalf of the Nuclear Decommissioning Authority.



National Skills Academy for Nuclear Ltd - <https://www.nsan.co.uk/>

NSAN is an employer led membership organisation established to ensure that the UK Nuclear Industry and its Supply Chain has the skilled, competent and safe workforce it needs to deal with the current and future UK nuclear programme.



Gen2 - <http://www.gen2.ac.uk/>

Gen2 is a provider of study programmes, traineeships, apprenticeships and further learning within Cumbria in the north west of England. It is committed to delivering high quality technical education and skills training.



nucleargraduates - <http://www.nucleargraduates.com>

A graduate programme with a difference! All ten members of the team behind *Critical Paths* are also members of Cohort 7 of the nucleargraduates programme. A two-year graduate job in the nuclear industry which offers great opportunities for training and job rotation.



2. Careers/Job Information

The nuclear industry offers challenging and rewarding work alongside good job security and development opportunities. There is a wide range of ways to enter the industry at various levels – apprenticeships, college courses, university degrees, graduate schemes etc. Engineers, environmental scientists, welders, business managers are just some of the large number of jobs that are available in the nuclear industry. You don't have to be a rocket scientist!

Nuclear Careers

Critical Paths -

<http://www.criticalpathsuk.com/roles>

On our website we have some examples of the variety of people who are proud to be part of the nuclear industry.

People behind the power -

<http://regennuclear.com/people/the-people-behind-the-power/>

A booklet which shows the range of people and jobs that make up the nuclear industry.

Written Role Profiles -

<http://regennuclear.com/careers/>

As well as the videos above, re:generation interviewed some people in the nuclear industry and wrote up their answers here.

Women in Nuclear Role Profiles –

<http://www.womeninnuclear.org.uk/Biographies>

There are an increasing number of women in the nuclear industry. See some examples of what they do day to day at this site.

UK nuclear industry job map -

<http://www.niauk.org/nia-industry-maps>

These handy maps let you check out what nuclear industry companies there are near you. You might be surprised!

Video Role Profiles -

<http://regennuclear.com/people/>

Re:generation provide a set of video interviews from various people in the industry. A great place to start before finding some people to ask yourself!

NSAN Careers Videos –

<https://www.nsan.co.uk/case-studies/careers>

NSAN has developed a set of video interviews of a range of apprentices and graduate engineers from within the nuclear industry.

Graduate insights: Tips about careers

The *Critical Paths* team would like to pass on the following tips from their recent experiences of leaving school and deciding on a career:

- Identify what you are passionate about and what you are good at.
- Talk to careers advisers but also try to talk to people in industry for advice.
- Get some work experience during your holidays, weekends or after school/college.
- An apprenticeship is just as good a way to enter the industry as any other, and you get paid!
- Try hard and you can achieve whatever you want to.
- Don't be scared to ask for help.
- You don't get if you don't ask.
- Don't expect to have your whole career planned out straight away. Some of our team didn't know what they wanted to do until they were 22, others still don't!

General Careers Information

The following websites are useful sources of general careers advice and inspiration.

Apprenticeships



<http://www.apprenticeships.org.uk/>

Tomorrow's Engineers



<http://www.tomorrowsengineers.org.uk/>

Gradcracker



<http://www.gradcracker.com/>

National Careers Service Videos



<https://www.youtube.com/user/RightDirectionForYou/videos/>

Plotr



<https://www.plotr.co.uk/>

Prospects



<http://www.prospects.ac.uk/careers.htm/>

Target Jobs



<https://targetjobs.co.uk/>

UCAS

University course database



<https://www.ucas.com/>

Your Life



<http://yourlife.org.uk>

Careers Information for Particular Subject Areas

Chemistry careers



<http://www.rsc.org/careers/future/>

Chemical engineering careers



<http://www.whynotchemeng.com/>

Civil Engineering careers



<http://www.ice.org.uk/What-is-civil-engineering>

Digital careers



<http://www.bigambition.co.uk/>

Electrical and Electronics Engineering careers



https://www.ieee.org/education_careers/index.html

Mechanical Engineering Information



<http://www.imeche.org/knowledge/library/guides/careers-information-guide>

Physics careers



<http://www.physics.org/careers.asp?contentid=381/>

Science and Maths careers



<http://www.futuremorph.org/>

Science careers

SCIENCE CAREER PATHWAYS



<http://sciencecareerpathways.com/home/>

3. Games and Videos

The following games and videos offer an alternative way of learning about the industry.

Games

Energy Database Cards -

[http://www.dalton.manchester.ac.uk/media/eps/dalton/documents/Energy-sources-card-deck-v9-\(Hi-res\).pdf](http://www.dalton.manchester.ac.uk/media/eps/dalton/documents/Energy-sources-card-deck-v9-(Hi-res).pdf)

We love Top Trumps, so were really excited to find out that The University of Manchester's Dalton Nuclear Institute has made a similar kind of game based on energy sources! Here you can download a pdf to print out and play. We have some sets of cards to give out at events. If you would like a set, get in touch! Alternatively, you can buy sets from <http://estore.manchester.ac.uk/browse/product.asp?compid=1&modid=1&catid=359>.



My2050 Energy Challenge - <http://my2050.decc.gov.uk/>

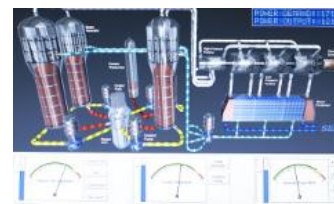
This game lets you take control of the energy industry. It challenges you to meet carbon emissions reduction targets by changing what energy production sources we rely on. Surprisingly tricky!



3D Nuclear Reactor Fly-Through & Simulator Game -

<http://www.dalton.manchester.ac.uk/engage/nrs/>

We showcased this at the Big Bang Fair with The University of Manchester's Dalton Nuclear Institute. They have developed a hands-on computer simulation game, where participants are shown the key components of a pressurised water reactor (PWR) and then allowed to operate the nuclear reactor to try and meet the days energy demands.



Energy flows game - http://www.sciencemuseum.org.uk/onlinestuff/games/energy_flows.aspx

This online quiz tests if you can work out how to power devices using different energy sources.

NSAN energy mix challenge - <https://www.nsan.co.uk/energy-mix-challenge>

NSAN has developed an interactive game to allow pupils to look at the energy mix needed to power the UK. You can request a copy using the contact details provided on this NSAN web page.

Videos

Nuclear Energy and Climate Challenges - <https://www.youtube.com/watch?v=T8paVKB7p2w>

This short video explains why nuclear energy is important in combating climate change.

Pandora's promise - <https://www.youtube.com/watch?v=bDw3ET3zqzk>

This link takes you to the trailer for an interesting documentary about nuclear power. The full film is available on DVD or on Netflix if you have a subscription.

TED: Ideas Worth Spreading – <http://www.ted.com/>

Check out this great collection of entertaining, funny and inspiring presentations. You can filter by topic or just ask for something which will make you go WOW! To start, watch Taylor Wilson talk about how he built a nuclear fusion reactor in his school classroom when he was just 14! http://www.ted.com/talks/taylor_wilson_yup_i_built_a_nuclear_fusion_reactor

NeoK12 - <http://www.neok12.com/Nuclear-Power.htm>

This site has a set of videos which explain some of the basics of nuclear technology.

4. Teacher resources

In case you are not aware, there is a vast collection of resources available for you to download from the internet to use with your classes.

TES Connect - <http://www.tes.co.uk/teaching-resources/>**National STEM Centre - <http://www.nationalstemcentre.org.uk/>****STEMworks - <http://www.stemworks.co.uk>****Energy foresight – via <https://www.nucleartrainingnetwork.com/login/index.php>**

NSAN's programme of materials (videos, interactive programmes and lesson plans) to support the radioactive materials and electrical energy aspects of the school science curriculum. Available from May 2015.

Furry Elephant - <http://www.furryelephant.com/>

It includes animations, simulations & activities for teaching and learning about selected topics.

IET Faraday - <http://faraday.theiet.org/>

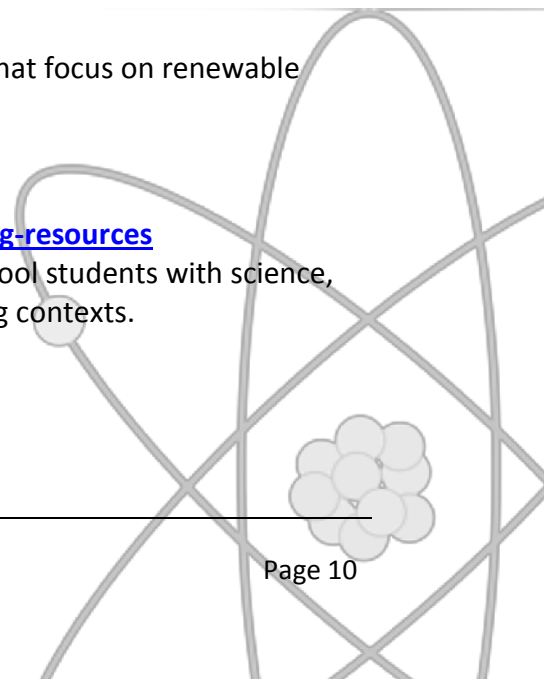
An exciting year-long programme of resources, activities, competitions and events designed to inspire young people about STEM.

Practical Action - <http://practicalaction.org/schools>

Practical Action has a range of science resources for Key Stages 2-4 that focus on renewable energy and climate change including the 'wind power challenge'.

Royal Academy of Engineering Engagement Programme -**<http://www.raeng.org.uk/education/schools/teaching-and-learning-resources>**

Resources created by teachers and engineers that aim to engage school students with science, technology and mathematics by placing these subjects in engineering contexts.



Royal Society of Chemistry - <http://www.rsc.org/resources-tools/education-resources>

Educators and students at all levels can access thousands of free resources, including experiments, videos, worksheets and games.

School Science - <http://www.schoolscience.co.uk/home>

Resources and news for science education.

STEMNET and STEM Clubs - <http://www.stemclubs.net/>,
<http://www.stemnet.org.uk/educators/>,
<http://resources.networking.stemnet.org.uk/resources>

Why not set up a STEM club and use Critical Paths resources to get you going?

Succeeding with Science - <http://www.succeedingwithscience.com/>

Part of the Succeeding with Science education programme supported by Sellafield Ltd, the website contains resources produced by teachers for teachers.

Twelve amazing science experiments -

<http://www.whynotchemeng.com/~media/Documents/whynotchemeng/Teacher%20Resources/12%20exciting%20experiments.pdf>

12 hands-on experiments, by Dr Mark Biddiss (<http://dr-mark.co.uk/>), designed for KS2/3.

5. Suggestions for Events, Trips & Visits to Nuclear Sites

A great way to reinforce more traditional learning is to attend events or go on trips. Here are some suggestions from us based on good experiences that we have had.

Annual Science Fairs

The Big Bang Fair - <http://www.thebigbangfair.co.uk/>

The Big Bang is the largest celebration of science, technology, engineering and maths for young people in the UK. It aims to show just how many exciting and rewarding opportunities there are out there for them with the right experience and qualifications. And it's free to attend!

There are also smaller 'Big Bang Near Me' events. Look out for those coming up near you!

<http://nearme.thebigbangfair.co.uk/>

Cambridge Science Festival - <http://www.sciencefestival.cam.ac.uk/>

Cheltenham Science Festival - <http://www.cheltenhamfestivals.com/science>

Glasgow Science Festival - <http://www.gla.ac.uk/events/sciencefestival/>

Edinburgh International Science Festival - <http://www.sciencefestival.co.uk/>

Manchester Science Festival - <http://www.manchestersciencefestival.com/>

Salters' Festival of Chemistry - <http://saltersinstitute.co.uk/festivals/>

The Salters' Chemistry Club encourages schools to set up Chemistry Clubs and then to take part in Salters' Festivals of Chemistry.

Trips to Nuclear Sites

You might be surprised to learn that nuclear sites offer tours and have visitor centres! They make for a really interesting and educational trip for both teachers and students. If you know of an industrial facility or power station near you, why not look at its website to see if it offers tours. These are some that we recommend:

Culham Centre for Fusion Energy (CCFE) - <http://www.ccf.ac.uk/Visits.aspx>

CCFE, near Oxford, is the UK's laboratory for fusion energy research. Fusion energy is what powers the sun!

EDF Sites - <http://www.edfenergy.com/energy/education/visitor-centres>

EDF operates some of the UK's power stations and has a very well established set of visitor centres and tour guides. Why not see if there is a plant to visit near you?

Springfields Fuels Ltd. - <http://www.westinghousenuclear.com/springfields/About/Community>

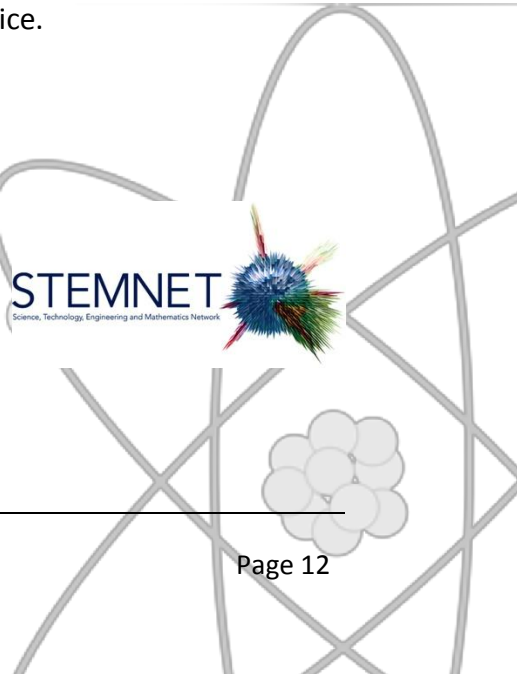
Springfields, near Preston, is the UK's nuclear fuel manufacturing facility, operated by Westinghouse. Tours can be organised to cover a range of themes including electricity, radiation or health and safety.

STEM Ambassadors

If it is not possible for you to attend events or go on trips, why not get someone to come to you? Request a STEM Ambassador's assistance from your local STEMNET office.

STEMNET - <http://www.stemnet.org.uk/ambassadors/>

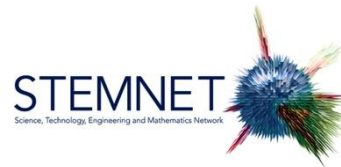
STEM Ambassadors use their enthusiasm and commitment to encourage young people to enjoy STEM subjects. They open the doors to a world of opportunities and possibilities which come from pursuing STEM subjects and careers. STEM Ambassadors not only inspire young people, they also support teachers in the classroom by explaining current applications of STEM in industry or research. STEM Ambassadors cross all ages and backgrounds, representing thousands of different employers across the UK.



Thanks again to our supporters!



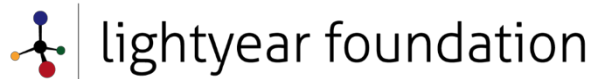
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Charitable Support

inNUvate Ltd. is entirely not for profit. All profits from *Critical Paths* will be donated to The Lightyear Foundation (<http://www.lightyearfoundation.org>).

The Lightyear Foundation shares our aim of promoting science and engineering subjects to school children. It is a charity devoted to changing the public perception of science through the promotion of scientific knowledge and understanding, innovation and encouraging people to be curious about the world around them.



Contact

If you would like to get in touch, we would love to hear from you.

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Check out our website for some more information and other Critical Paths resources.

www.CriticalPathsUK.com