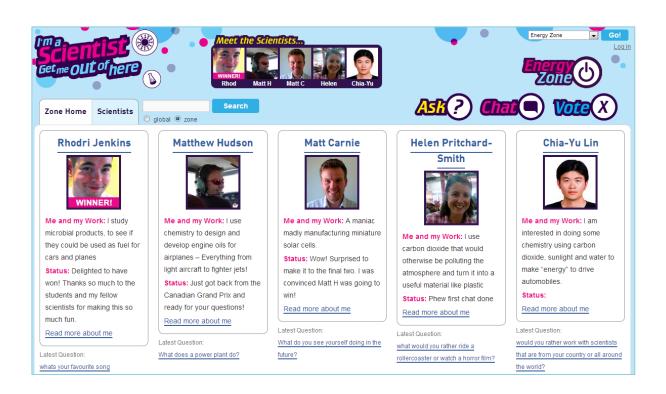


# RSC | Advancing the Chemical Sciences

# Evaluation report Energy Zone June 2013

# Funded by the Royal Society of Chemistry

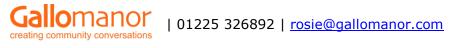






# **Contents**

1.	Executive summary		
2.	Introduction and background	3	
3.	Activity in the zone	4	
4.	Questions and live chats	5	
	Popular topics in live chats	5	
	Popular topics in the ASK Q&A section	5	
	Question coding	6	
	Fact or opinion	6	
	Question topics	6	
	Examples of good engagement	7	
	Comments from the RSC 'chemnet' username	7	
5.	Participation	9	
	Scientists	9	
	Scientist Interviews	9	
	Schools	11	
6.	Publicity	12	
7.	Benefits and quotes	13	
	Scientists	13	
	Students & teachers	13	



## 1. Executive summary

The Energy Zone in I'm a Scientist, Get me out of here! 17th – 28th June 2013 was successful:

- 1. The students really got into the zone theme. 23% of the questions approved in ASK were about Energy, with climate change and sustainable energy particularly popular topics. Students asked about how solar cells are made, how biofuel can be made from biscuits, and about environmental problems and when the world will run out of energy. They were also interested in the scientists' opinions on subjects such as sustainable energy.
- 2. 34 RSC members applied to take part, indicating a lot of interest in public engagement in the society. Before the RSC put the call out there were 16 scientists signed up who told us they were RSC members, of whom 6 had taken part in previous IAS events. After the call went out on 26th April, an additional 34 RSC members signed up – quite an increase! The scientists were from a wide range of research areas, not limited to Energy.
- 3. Overall the scientists in the zone enjoyed taking part and benefited from it. Matt C said he got "an understanding of what are the important issues for younger students - it made me think positively about the future if kids are thinking about these things now, perhaps all will be good in the future!"
- 4. The scientists were challenged within and beyond their areas of research. All engaged well and were keen to answer questions and take part in the live chats. As Rhod said to the students in a post on the site after the event (energyj13.imascientist.org.uk/2013/07/08/thank-you-from-your-winner-rhod/) "On top of all the scientific questions you asked, of which there were many, the questions which got me thinking the most were those about who and what my work affects."
- 5. The Royal Society of Chemistry used a student account with the username 'chemnet' to post relevant links to their education sites. The *chemnet* account left comments on 13 questions. In the future we can improve the way that these comments are left: we can create an account that looks different to other student accounts, use an RSC logo as the avatar, and make the comments appear a different colour to student comments. This would make it easier for the RSC to comment and would increase the number of students that see the comments as they would stand out more.

#### The Energy Zone was **less successful** in that:

1. The number of students registered in the zone was 290, despite aiming for 330 per zone. This brought the number of questions, and therefore the number of answers, in the zone down. However, of the 290 students who registered, 241 (83%) actively took part in ASK, CHAT or VOTE. We have done a lot of analysis on why some zones are busier than others but haven't found any patterns to explain it. One theory is that there will always be some teachers that don't take their place up (due to illness, changed timetables etc) and if these teachers cluster in a zone it will bring the number of students down. We ask teachers what zones they'd like to be in before we allocate them, and all teachers in the zone chose Energy, so the zone theme wasn't the problem.



# 2. Introduction and background

#### I'm a Scientist, Get me out of here! (IAS)

I'm a Scientist, Get me out of here! is an online event where students get to meet and interact with real scientists. It's an X Factor-style competition between the scientists, where students are the judges. Students submit questions which the scientists will try to answer by



the next day. Students then talk to the scientists in live online chat room sessions, where they ask questions, learn more about the scientists, and let scientists know their opinions. It takes place online over a two week period.

The event ran for the 12th time from 17th – 28th June 2013. In each zone there are 5 scientists and around 330 school students in 20 classes. IAS is designed to support the How Science Works curriculum and to bring real science to life for students, supported by carefully developed classroom resources. It helps:

- Develop discussion and critical thinking skills
- Cover key concepts in How Science Works
- Get students engaged with science
- Provide lesson plans and resources for different ages and ability levels, between years 7 − 13

#### The Royal Society of Chemistry



<u>The Royal Society of Chemistry</u> is the largest organisation in Europe for

advancing the chemical sciences. Supported by a worldwide network of members and an international publishing business, our activities span education, conferences, science policy and the promotion of chemistry to the public. In the UK, we are the largest non-governmental supporter of UK chemistry education.

Our activities encompass formal and informal education from primary through to Higher Education levels and we are committed to providing Continuing Professional Development (CPD) for those teaching chemistry. We work closely with the government and other organisations on issues which may impact on science education and encourage initiatives to attract students to the chemical sciences from all parts of society and raise awareness of potential careers with chemistry.



# 3. Activity in the zone

The Energy Zone was one of 18 zones in I'm a Scientist in June 2013. The zone was just below average across most measures of activity, mainly due to the lower number of students registered in the zone. We aim for 330 students per zone and there were 290 in the Energy Zone.

We try to balance every zone with teachers that have run I'm a Scientist before and those that are new to the project, by the % of students getting 5 A\*-C at GCSE and geographical location. We ask teachers what zones they'd like to be in before we allocate them, and all teachers in the zone chose Energy, so the zone theme wasn't the problem. We have done a lot of analysis on why some zones are

#### Page views in the Energy Zone

Zone page	Page views
Total zone	17,252
ASK page	1,175
CHAT page	1,902
VOTE page	1,107
Rhodri Jenkins	844
Matt Hudson	697
Matt Carnie	724
Helen Pritchard-Smith	636
Chia-Yu Lin	688

busier than others but haven't found any patterns to explain it. One theory is that there will always be some teachers that don't take their place up (due to illness, changed timetables etc) and if these teachers cluster in a zone it will bring the number of students down.

These students still took part in 15 live chats – more than the average across all zones. 241 of the 290 students who registered asked a question, talked in a live chat, voted or left a comment. The Energy Zone was very busy during the first week, with 12 live chats, but became quieter in the second week, with fewer new questions coming in. All of the scientists engaged well with the students throughout.

Figures from I'm a Scientist June 2013 for the zone, the average of all 18 zones, and the whole event

	Energy Zone	Average of all 18 zones	Total in all 18 zones
Number of registered students	290	372	6,697
% of active students (ASK, CHAT, VOTE or commented)	83%	83%	-
Number of questions asked	897	963	17,337
Number of questions approved	251	309	5,558
Number of students that asked questions	146	154	2,766
Number of questions answered	221	272	4,894
Number of answers given	382	533	9,597
Total number of comments	63	73	1,306
Number of votes	233	276	4,962
Number of live chats	15	13	240
Number of lines of live chat	4,328	4,735	85,225
Number of students who chatted	211	244	4,391
Number of schools	7	8	138



# 4. Questions and live chats

#### Popular topics in live chats

In the live chats questions often started out along the lines of 'why do you want to win?' 'why should we vote for you?' and 'do you work in a team?' The students were also interested to know what the scientists would do if they weren't in their current careers. Rhod and Matt C took a number of questions on how various materials, including coffee, biscuits and donuts, could be turned into biofuels.

Climate change and sustainable energy sources were popular topics, with students asking which energy sources are best and what the differences are, as well as wanting explanations for how things like biofuels work. The scientists were also asked to explain or dispel rumours and ideas, such as 'does enough sunlight hit the Earth's surface in a minute to power global energy demand for a year?' Common questions included finding out the scientists' personal opinions on sustainable energy, whether their research is helping the environment, or 'repairing the ozone layer', and when the world is going to run out of energy. As Rhod noted, the students "were worried about their future".

#### Popular topics in the ASK Q&A section

The students used the Q&A section of the site to explore topics from the live chats in more depth, allowing the scientists to expand on their answers to when they first became interested in science, if they like science and what their favourite science is. And the students were also interested to know how the scientists' work helped both people and the environment. General questions included whether the scientists work with animals, what their opinions on animal testing are and whether they work alone or in a team.

The students asked more specific energy questions in the Q&A section; what solar cells actually are, how they are made, and what their potential is for providing green energy. There were also a number of questions regarding what, in the scientists' opinions, is the most sustainable energy source, and which source is best poised to provide energy for the future. Students were very interested in Matt H's work with aeroplanes, and Rhod and Matt C's apparent obsession with coffee, asking both 'Why do you drink so much coffee?' and 'How would you use coffee to make fuel?'

#### **Sample questions**

If an F1 car was to be driven on the moon, what modifications would be needed?

How much energy is required from the solar cells to heat up your coffee?

<u>Do you think we will come up with an alternative to fossil fuels within the next 10 years or do you think much more work is needed?</u>

What is the most useful energy? And why?

How would you use coffee to make fuel?

What is energy and why do we have it, who thought that we need it and what would life be like without it?

Do you have to be smart to be a scientist?



#### Question coding

Questions posed through the ASK facility are moderated by the team before being approved to the scientists. Due to the large volume of questions asked there are options to mark questions as a duplicate of another, refer the student to see the scientist's profile if the question has been answered there, and delete rude or offensive questions (see moderation policy: <a href="mailto:imascientist.org.uk/scientists/help-2#moderation">imascientist.org.uk/scientists/help-2#moderation</a>).

To see what themes came out in the ASK section we analysed the 251 questions that were approved in more detail. Each question was sorted by two measures: the type of question (whether the student was asking for a Fact or an Opinion) and the subject the question was on.

#### Fact or opinion

92% of all the questions asked to the scientists were asking for Facts (What? Where? Why? and How?) and 8% asked for the scientists' opinions (What do you think?).

Type of question	Count	%
Fact	232	92%
Opinion	19	8%

While the majority of questions were aimed at finding out an answer to a question, a small number of students did also want to engage with the scientists on a more personal level. This more personal connection extended much more into the live chats where the students were keen to hear the scientists' opinions.

#### Question topics

Tagging the questions was fairly subjective, as some questions could fit into multiple topics. The questions can quite generally be split into those asking directly about science, and more personal ones such as about being a scientist or careers. The top categories are shown on the right.

The most common topic was clearly Energy, at 23% of all approved questions — 'Is it true that fridges in the US consume the same amount of energy as 25 large power plants produce every year?' 'What is the most powerful thing a solar cell can heat ???????' Theming a zone generally increases the % of questions asked on that theme to around 20%, so the 23% of questions on the theme in the Energy zone is slightly higher than normal.

Subject	Count	%
Energy	57	23%
Career	25	10%
Personal	22	9%
Workday	20	8%
Technology	17	7%
Science	15	6%
Education	10	4%
Environment	9	4%
Space	9	4%
Future	7	3%
Invention	7	3%

10% of questions asked in the Energy Zone were about careers –

'Did you always know you wanted to be a scientist?' 'Do you think you will always be involved with science?' And a further 8% were about the Workday of a scientist – 'Is it hard to collaborate with your colleagues?' 'Do you ever have a plan for a day at work?'

9% of questions were tagged as Personal – 'Do you prefer skateboarding or science?' 'If you won the lottery how would you spend your money?' The students were keen to see the scientists as real people, not just asking about their work. Aside from a handful of questions about the I'm a Scientist event, education and those tagged as other (such as 'Do you believe that the lunar landing was

real?') the remaining questions were all asking about different areas of science from the Environment to Inventions.

#### Examples of good engagement

There was some good chat about creating solar cells:

gems: Is there something special in particular everday objects that can be easily used to make solar cells?

mattcarnie: You can make a solar cell from some glass, some dye and some pencils! There are videos on youtube on how to make them from donuts!

mattcarnie: Solar cells from donuts: «link»

gems: what special thing is there in donuts that means they can be turned into solar cells? mattcarnie: You can extract a chemical from the sugar called titanium dioxide, this is a semiconductor. Watch the YouTube clip. Its fun!

#### And interest in Matt H's travelling:

**direction1369:** do you travel all over the world?

matthewhudson: Yes, I travel all the time! This week I went ot Ohio in America to meet the airforce and next week I will go to Peru

direction1369: WOW! don't you ever get you ear pop when u on the plane?

matthewhudson: Yes, my ears pop all the time on planes, But I take about 60 flights a year, so I have to get used to it! Your ears 'pop' due to the change in air pressure. There is air inside your ears that gets sealed in, as the pressure inside the plane drops, you have to release the trapped air in your ear, that is what makes the 'pop' as it comes out

There were some fun answers to this question: 'Do you dress your pets up for special occasions?'. Scientists from other zones joined in answering some Energy questions: 'What is string theory?' and 'Would you rather sky dive for a day or ride a dinosaur?'

#### Comments from the RSC 'chemnet' username

The Royal Society of Chemistry used a student account with the username 'chemnet' to post relevant links to their education sites. The chemnet account left comments on 13 questions, such as:

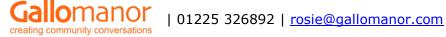
Do you think we will have to fundamentally change our lifestyles if we want to survive in the future?

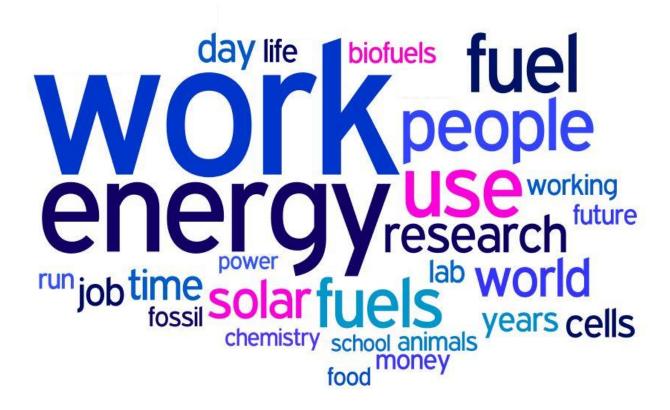
do u think in the future all cars will be electronic and that you wont need fule.

what do you think is the best renewable energy

Hi there, What chemical reactions will take place when trying to complete your investigation of trying to make a Automobile run off carbondioxide, sunlight, water

what has a higher frequency gamma rays or x-rays





The most popular used words from the Energy Zone live chats that took place over the event. The size of the word represents its usage and popularity.

advice2 aeroplane3 alien2 animal3 carbon dioxide5 chemistry10 coffee2

dinosaur2 earth3 education15 electricity4 end of the world4

energy 35 environment 7 experiment 8 extinction 2 F13 flight 2 food 3

fuel 10 future 17 health 3 history 2 how science works 16

life 10 medicine 4 microorganism 3 music 3 personal 63 preference 25 quirky 23 renewable

energy2 research26 routine4 society5 Solar cells12 space10 technology6 transport7

travel2 vote2 win2 WOrk36 work-life balance2

Key words in the Energy Zone. Moderators tag the keywords in each question so when people are browsing the website, the site can suggest 'related questions' on a similar topic that they might also want to read. The size of the word represents its popularity; the superscript number indicates the number of times it was tagged as a key word.

# 5. Participation

#### Scientists

34 RSC members applied to take part, indicating a lot of interest in public engagement in the society. Before the RSC put the call out there were 16



scientists signed up who told us they were RSC members, of whom 6 had taken part in previous IAS events. After the call went out on 26th April, an additional 34 RSC members signed up – quite an increase! The scientists were from a wide range of research areas, not limited to Energy.

The 5 scientists in the Energy Zone were based at a range of institutions; four were at UK universities, while Matt Hudson worked in the USA for Shell. He took part in many live chats that would have been very early in the morning for him. During one chat he was in an airport waiting to catch a flight to visit the US Air force! There were 233 votes cast in the Energy Zone over four rounds of voting, with one scientist evicted at each round. Students could cast their vote in each round. **Rhodri Jenkins** was crowned the winner of the Energy Zone.

Scientist	Institute	Brief description of their research, written by the scientist for rating by students & teachers	Result	% of votes	Number of profile views
Rhod	University of	I study the stuff that microbes make to	1st	39%	844
Jenkins	Bath	see if it can be used to fuel the cars and planes of the future, and make sure we'll all be able to on holidays!			
Matt	Swansea	I use cheap materials to turn the Sun's	2nd	26%	724
Carnie	University	rays into electricity!			
Matt Hudson	Shell	I keep airplanes and helicopters in the sky with chemistry!	3rd	22%	697
Chia-Yu Lin	University of Cambridge	Capture sunlight to split water into hydrogen and oxygen	4th	11%	688
Helen	University of	Finding an efficient way of using carbon	5th	2%	636
Pritchard- Smith	Bristol	dioxide to make useful materials			

#### Scientist Interviews

We conducted 3 telephone interviews with Rhodri Jenkins, Matt Carnie & Helen Pritchard-Smith in the week commencing 22nd July 2013. Rhod and Matt C were both very positive

"It was great, I was really surprised with how well it went"

"I loved it, I thought it was really good fun"

Helen enjoyed taking part less

"I was more excited about the thought of it than actually taking part".



#### Living up to expectations

The event exceeded Matt's expectations; it was "chaotically exciting" with "all of these questions thrown at you, you have to be on your toes". Rhod was initially worried about the live chats and constant questions, but found the students "insightful" with a "vast majority of relevant questions" and following up his answers with "more advanced and probing questions". He saw IAS as a "fantastic method - brilliant way for students to get in contact with us", adding, "face to face they [students] may not have the confidence".

Helen's views differed greatly from those of Matt and Rhod, saying: "I don't feel like we got close to discussion" and hoping the event would involve "challenging what they'd read, and their perceptions". She found it "mildly distressing that students didn't grasp the impact and how important science is".

#### **Time commitment**

There were mixed feelings on this; Helen found the event "time consuming and labour intensive", though Rhod found it "pretty flexible - 30 to 45 minutes a chat per day's not bad". Some of Rhod's colleagues had taken part previously and based on speaking to them he thought taking part "seemed effective and not that time intensive".

#### Comparison to other public engagement activities

Matt has often found schools engagement events "disheartening" as older students are often "afraid of not looking cool". IAS however "was different in that the enthusiasm of the students was clear, they were less worried about not looking cool". The students "seemed really interested in the benefits of our work to the environment - I was surprised and impressed". Rhod felt IAS was "much more organised - they [students] can look at who you are and get a vague understanding of your work so they can ask relevant questions."

#### Benefits from taking part

Rhod gave an illuminating comment about how he judged the level to communicate at - "I very quickly learnt what sort of level [the students were at], they know a lot more than I thought they did. I learnt the best way to communicate my research to that age group. I didn't feel like I had to dumb it down much." Matt felt he gained "a little bit more of an understanding of what are the important issues for younger students - it made me think positively about the future if kids are thinking about these things now, perhaps all will be good in the future!"

Helen was much less enthusiastic about her experience, feeling she spent too much time on the questions and not enough on the chats, which she felt would have made more of a difference to gaining student votes. She was disappointed that the students didn't leave more comments in the ASK section to say whether or not her answers had been useful or interesting, and said she didn't think the students had read her profile, which she spent a lot of time on. Despite this she did say that the students "obviously identified we were human beings, and that science isn't an unreachable goal", which she saw as a positive outcome. She also said: "chats were difficult, but being rapid and concise was a good thing."



Rhod and Matt both agreed they would recommend the event to colleagues, that they had improved their communication skills and that they'd do more public engagement work in future. Helen plans to continue to do more traditional forms of outreach, saying "there are other more obviously rewarding forms of public engagement."

#### Suggestions of how to improve the event

When asked for suggestions for ways to improve the event, Helen said she thought it would work better through Skype, that there were too many repeat questions, and that she'd had problems not receiving emails about chats during the first week. Rhod suggested finding a way to direct questions back to students more quickly, such as by clicking on their name, but overall said it was "very smoothly run". Matt said: "I can't think of any improvements, instructions were clear [mainly used the website for information], it was really well run, lots of mods to help out, seemed to go pretty smoothly."

#### **Schools**

7 of the 10 schools given places in the Energy Zone turned up – this drop out level is normal. As shown on the map below there's a good spread of school locations around the country.



The location of the 7 schools in the UK that took part in the Energy Zone (marked in red) and the 4 scientists based in the UK (shown in blue)

# 6. Publicity

I'm a Scientist (<u>@imascientist</u>) regularly tweeted event updates and popular questions asked across all zones and linked to <u>@RSC\_Comms</u>. Two of the Energy scientists (Rhod and Matt C) were on Twitter and tweeted about the event.



Rhod Jenkins @rhodrij

1 Jul

Thrilled to have won the energy zone for @imascientist! Hopefully I encourage d she students to pursue the sciences!

Expand



Sustainable Chem @csctbath

28 Jun

Congratulations to @rhodrij (a DTC student) and Jess Bean (@BathChem) on winning their @imascientist zones today!

Retweeted by Rhod Jenkins Expand



I'm a Scientist Team @imascientist

27 Jun

Good luck to @rhodrij & @MattCarnie the final 2 scientists in RSC funded Energy Zone energyj13.imascientist.org.uk/scientists #IAS2013 @RSC Comms

Retweeted by Matt Carnie

Expand



I'm a Scientist Team @imascientist

26 Jun

"What is energy, why do we have it ... and what would life be like with out it?" energyj13.imascientist.org.uk/2013/06/25/wha...

@RSC\_Comms #IAS2013

Retweeted by Matt Carnie

Expand



Rhod Jenkins @rhodrij

17 Jun

Just took part in my first two live chats for @imascientist! Some awesome questions. Looking forward to more!

Expand



Matt Carnie @MattCarnie

17 Jun

Phew! Just had my 1st @imascientist chat. Exhausting but enjoyed every minute of it!

Expand



I'm a Scientist Team @imascientist

6 Jun

Taking part in the Energy Zone: @MattCarnie @hpritchardsmit Rhod, Matt & Chia-Yu energyj13.imascientist.org.uk/scientists/

@RSC comms #IAS2013

Retweeted by Rhod Jenkins

Expand



### 7. Benefits and quotes

#### Scientists

Scientists improved their communication skills and often found a renewed vigour for science and their research. Here are some of their comments:

"The last two weeks were so much fun and I was pleasantly surprised with how much you guys were engaged, how insightful your questions were" – Rhod Jenkins, scientist

"Talking to you all is the best part of science" – Helen Pritchard-Smith, scientist

"Some really insightful questions about our work and energy in general. A lot of these students are smarter than I was at their age!" – Rhod Jenkins, scientist

"It is fun, I am still learning how to communicate the science with different ages..." – Chia-Yu Lin, scientist

"And lastly I'd like to thank you guys – the students. None of this would be happening if you weren't enthusiastic, curious, hungry to learn about science ... and I'd just like to properly thank you for making this a truly brilliant and fun experience. If I can, I'll be taking part again!" – Rhod Jenkins, scientist

#### Students & teachers

Students gained an increased awareness of what scientists actually do and what scientists are like.

Students engaged in debates with scientists, after scientists answered questions. Students felt empowered enough to tell scientists their views and discuss topics with them. It also showed students that scientists don't always know the answer. Scientists were challenged by the questions asked.

Many students left positive comments during or after live chats, including:

"I enjoyed this chat very much thank you for time and your a good guy rhod hope you do well" – sciencecrazy11, student

"Thanks chiayulin for answering my questions you have been great talking to you. You are faviote BYE" — cheeseyfirebear, student

"that is amaze balls I did not know that" – storm002, student

Teachers noted how their students had benefited from taking part:

"Thank you very much for all your answers. The students have actually stayed over break to continue asking you questions" — caspinall, teacher

"Thanks very much for coming to the chat Rhod and Chia-Yu. The girls don't want the chat to end!" —maryerskineschool2, teacher

