



An Association for Retired Professional Engineers **NEWSLETTER August 2025**

President's Message

Hello again everyone, and a warm welcome to the August Newsletter.

I hope you are all relaxing and keeping well during the summer break and looking forward to go again for another season of monthly meetings.

Last season saw a packed programme of talks, and a big 'thanks' must go to Mike, our programme manager for making all this happen, faced with some last minute twists and turns that happened, that you never heard of.

I must also thank all my other fellow committee members for all their hard work in with everything, to keep the show on the road, everyone having played their part.

This year saw another Christmas Lunch and on December 12th 24 members and guests turned up at the Findon Manor Hotel and enjoyed the food presented to them.

Arrangements are in hand for this year's lunch and details will be out when available, but for your diaries, the date will be Thursday 11th December 2025.

On 15th October there was a visit to Brighton Rail Electrical Control Room which was attended by 16 members and a big thanks must go the Derek for arranging this.

A lot of work goes in to arranging these visits and perhaps a discussion point at the AGM is required to ask if this is what the membership wants.

Talking of the AGM (on September 16th), the present committee are all prepared to stand again, BUT there is room for any other members who would like to join us. Is this something you feel is for you???

As I said earlier, I would like to thank the entire committee for their work and going forward we will do it all again to bring you a range of talks to enjoy in the coming months, all of which are listed in this newsletter.

Keep an eye on your emails as our Membership Officer, Mike, will be sending out details of things you need to know as they crop up.

Enjoy the rest of the summer and I look forward to seeing you all at our AGM followed by the first talk of the season by our own David James entitled 'Small Modular Reactors' which is at 2.30 on 16th September, usual place.

George Woollard
President

PROGRAMME OF EVENTS September 2025 – December 2025

16th September	Tuesday	AGM & talk - Small Modular Reactors
18th September	Thursday	Coffee – at Spotted Cow, Angmering
25th September	Thursday	Coffee – with Partners at Swallow’s Return
30th September	Tuesday	Visit - Shoreham Power Station
14th October	Tuesday	Talk - Industrial AI for Autonomous Operation
16th October	Thursday	Coffee – at Spotted Cow, Angmering
30th October	Thursday	Coffee – with Partners at Swallow’s Return
11th November	Tuesday	Talk - A History of Railway Signalling
20th November	Thursday	Coffee – at Spotted Cow, Angmering
27th November	Thursday	Coffee – with Partners at Swallow’s Return
9th December	Tuesday	Talk - Weather to be or not to be
18th December	Thursday	Coffee – at Spotted Cow, Angmering

All Talks and Meetings will commence at 2.30 pm and be held in the Pavilion, Field Place, Worthing, unless another venue or time is indicated. Timings for visits and outings will be as printed in the detailed description of the activity.

Coffee mornings commence at 10.30 am.

We do sometimes have to cancel/rearrange talks and visits, in which case we will inform our members of changes to our programme by email. Members can always look on our website for up-to-date details of events.

Website of the RCEA

Our website, www.rceasussex.org.uk carries the very latest information on all our events.

New Members and Speakers for Talks

The RCEA needs new members and speakers to ensure that we can continue as a thriving organisation. Please think of appropriate people you know and encourage them to come along to our talks and hopefully join the RCEA.

We also need more speakers to give talks to us at our monthly meetings on Tuesday afternoons from September to April.

We are aware that many members have the knowledge from their working careers to provide interesting talks. If you are willing to give a talk, please let us know.

New Members

- Julia Eastaugh, Rustington
- Ivan Farrow, Lancing (re-joiner)

Member's Articles

Our newsletters are also a vehicle for our members to publish short articles on engineering related topics. Articles can be of any type, technical, review or opinion aimed to stimulate discussion. So if you've always wanted to put pen to paper (or today's equivalent) then please send your article to our editor, David James (dr.david.james@gmail.com). In this edition we have a short article by Roger Arthur.

RCEA Insurance

Members need to be aware that the insurance policy that the Association holds is solely for the protection for the assets and liabilities for the Association as an entity. The policy does not provide cover for personal injury or loss to individual members. Members attend the Association's events at their own risk although under some circumstances there may be some cover from the insurance arrangements of the venue owner.

Brief Details – Talks, Outings and other activities. September 2025 to December 2025

AGM & Talk

Tuesday, 16th September 2025 - Small Modular Reactors

David James - Member

Recent news items suggest that Small Modular Reactors are the future of nuclear power in the UK. But what are they? Why is there a growing interest in their development? What technologies do they use? And when are they likely to be putting power into the grid? This talk hopes to shed some light on to these questions.

Talk

Tuesday, 14th October 2025 - Industrial AI for Autonomous Operation

David Smith

The use of AI in process control brings a new horizon for the autonomous plant. An AI controller can minimise human intervention in processes with superior capability relative to conventional closed loop and advanced control technologies.

Talk

Tuesday, 11th November 2025 - A History of Railway Signalling

Clive Kessal

Clive will cover the introduction of the European Train Control System in the UK, including:

1. Brief description of signalling systems down the ages
2. Purpose and Principles
3. Block sections and signal aspects
4. Mechanical signals
5. Colour light signals
6. Detection of trains
7. Route signalling

8. Points
9. Interlockings
10. Train describers
11. Single lines
12. Level crossings
13. Train protection systems
14. Modern era - ERTMS and ETCS
15. Summary

Talk

Tuesday, 9th December 2025 -Weather to be or not to be

Bob Riddaway

The establishment of a network of telegraphs allowed the collection of weather observations in real time. This led to the issuing of the first public weather forecast in 1861. Since then technological developments and enhanced understanding of atmospheric processes have underpinned the increase in accuracy of weather forecasts. In particular, from the mid-1960s the use of increasingly sophisticated numerical models coupled with an enhanced availability of observations, especially using satellites, have led to modern five-day forecasts being as accurate as one-day forecasts 50 years ago. These developments will be discussed along with how numerical models are used to investigate climate change.

Reports

Click on a title to go to that report.

1. '[Shoreham Power Station](#)', 3rd June 2025
2. '[Brighton Tram 53](#)', 9th July 2025

Visit

Tuesday 3rd June 2025

Shoreham Power Station

Report by Mike Wooldridge.

17 of us were treated to a tour of the station, with a very informative and full introduction by the Station Manager – Gordon Walker. The reader is referred to facts about the Station on the Shoreham Power Station website. Briefly it is a Combined Cycle Gas Turbine plant rated at 460MW. And at the time of our visit it was producing some 220MW. The rest of this write up picks up points raised during 'the introduction' (which happily took up some 100 minutes of our allotted 140 minutes).



RCEA Visitors

History. The station was commissioned
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in 2000, on the site of the old Brighton B station. 50% Joint Venture partner, Scottish Power wholly acquired it in 2004, and indeed Gordon has a strong Scottish accent, having been in the industry for 25 years. The plant is now owned by VPI which operates 5 power stations in the UK and is wholly owned by Vitol, a privately owned company with an income in 2023 of US\$13bn. Wikipedia cites under 'key people', the CEO, Russel Hardy who, according to Gordon, takes a real down-to-earth interest in the station and has invested accordingly.

Thermal Efficiency. When built, the Station had an efficiency of 55%. However it had a major upgrade (eg all the turbine blades were upgraded) in 2022, which puts it into the 'F class' and now has an overall efficiency of around 58%! This puts it well up the league of UK power stations and as such it generates for some 85% of the time – and nearer 100% in Winter. This compares with approximately 40% before the upgrade. It seems that the National Grid (NESO) go for the most economic generators, and those 3 percentage points make a significant difference to the pecking order when it comes to choosing their power sources.

The gas supply. The site takes its fuel gas from the UK grid at a site on the Downs (opposite the Waterhall golf club, near Devils Dyke). Here the local grid pressure (30 bar) is dropped to 6 bar, which arrives at the Station via a 26" pipe running through the original cable tunnel under the Shoreham harbour basin.

The turbines. The picture on the [web site](#) shows the 2-stage gas turbine, opened up. This features two separate combustion chambers, with the input gas being raised to a pre-combustion pressure of 48.5 bar. The exhaust gas is taken off at 600°C whereupon it feeds a boiler for producing steam. Said steam is then fed into three separate steam turbines, all on the same shaft (but see below), at high, intermediate, and low pressures.

The 'rotor.' This warrants its own paragraph here, as Gordon took pains to describe just how beautiful it was from an engineering point of view (designed by 'Swiss watchmakers'?) When originally made, there were three main turbine producers – GE, Siemens, and Alstom. According to Gordon, the Shoreham Alstom GT26 turbine has eight times more constituent components than say the GE one. It also has a welded shaft which makes it more reliable than one using tie rods.

The actual layout in the turbine hall is as follows. Starting with the alternator, going west is the gas turbine with its exhaust taken off at the west end feeding direct into the boiler – the photo shows the large, heavily insulated duct connecting the two. At the east end, the alternator shaft has a clutch (made by Triple S– see the web video showing its spiral 'screw' 'spigot' engaging into a coaxial spiral 'nut' on the driven shaft) connecting it to the steam turbines.

There is no rotating exciter as such – the stator current is produced by a static power source. The photo on the next page, looking east, shows some distant yellow/black lines on the floor. These conceal rails running perpendicular to the main shaft line, and are there to enable the alternator to be disconnected and transported out sideways for maintenance.



Duct between gas turbine and boiler

Plant life expectancy. In response to a question, Gordon said that one significant factor was high temperature pipework creep life. The photo on the next page just shows on the left, some sections of (very thick walled) pipe presumably stored for potential welding repairs. The pipe, made of grade 91 steel (not stainless) has a notional creep life of 25 years, but this is dependent on a number of factors, including steam temperature. 565°C is a maximum, but Shoreham likes to run at 520 to 540°C which greatly increases creep life – maybe to 40 years?

Start up notes. From cold, the gas turbine takes about 17 minutes to come on stream. The steam turbine can take as long as 3½ hours, although if already hot, it can be almost immediate. We also asked about black starting – ie no incoming Grid power. Because the gas turbine needs such high pressures to operate (48bar for gas; 31bar for the air) it needs substantial power to get started – about 32MW for it and the rest of the Station.

The electricity. Power is generated at 21kV and is then transformed up to 132kV for outgoing transmission to Southern Cross (just south of the Old Shoreham Road), and down to 11kV for Station use. Most of the 11kV is then reduced to 415V, although some machines work at 6.6kV. As regards the outgoing power, typically much of it is used locally in Brighton and the surrounding area, but at times maybe 100MW carries on up to Bolney for feeding into the 400kV National Grid.

Power factor is kept within 0.99 lag and 0.95 lead by altering the outgoing transformer tapping – 20 MVar per tap.

Hydrogen, and Nitrogen. We were shown the compound where these are stored. Nitrogen is used for purging pipes; Hydrogen for cooling the alternator. We did not have time to ask for more details, but when the writer visited Brighton B some 66 years ago he remembers that one of the 6 alternators had just been upgraded from 55MW to 60MW by using hydrogen cooling. Presumably this capacity increase factor still applies today? Gordon replies: Yes, H₂ has a higher thermal conductivity than air. As such you can put more power through an H₂ cooled machine than an air cooled one.

Water. The plant needs between 2 and 4 tons of demineralised water per hour to feed into the boiler. This is matched by a corresponding water drain out. Although a closed system, and hence superficially not needing any such top up once initially filled, the closed loop water gradually deteriorates (eg picking up corrosion products from the boiler



Storage way north of main shaft



Control Room

and pipe surfaces) and has to be monitored to keep within chemical limits. Condensed water (and top up water) is fed back into the boiler using a 250KW centrifugal pump, delivering 180 bar.

The other 'water' of interest is sea water used for cooling the condenser. The Station is permitted to raise the temperature of said sea water, by 16°C, or, if special permission is granted by the Environment Agency, 20°C on occasions. 16°C only needs to be exceeded when running on full bypass mode (i.e. GT only with no ST, so all the steam generated in the boiler is dumped directly to the condenser). This only happens, generally, after a major overhaul when Alstom (now GE) have to tune the combustion parameters of the engine (and hence don't want to see the influence of the steam turbine on the overall process). This photo shows a picture taken two weeks earlier, by the writer, of the cooling water outflow. (Presumably the anglers are rejoicing at the increased utilisation factor since the Station efficiency was upgraded – and hence the increased fish catch due to the more frequent warm water outflow?)



Cooling water outflow

The Chimney. Calculations show that the chimney height only needs to be around 60m in order to diffuse the exhaust gasses to acceptable levels at ground level. However, when planning permission was originally sought, the Council insisted on 100m, because the chimney (actually had previously been two, then one) was marked on nautical charts as a navigation feature. Gordon told us that over the last six years, the extra 40m had cost £5.5m in maintenance costs – mainly shot blasting and painting. The chimney has a 'damping ring' at the top to prevent excessive vibrations building up due to wind forces.

Staffing. Gordon told us that the Station has a workforce of 28, of whom 3 are apprentices. However the Company finds it has a job recruiting youngsters, even though they offer a comprehensive training programme which, after 3½ years training, can provide a 22 year old with a very good salary and excellent career prospects.

Gordon also referred to the impending problems of finding other competent contractors – eg a shortage of welders coming into the industry.

The Station is run on two 12 hour shifts, and operators have two weeks off after seven weeks.

The tour. We were treated to the so-called 'royal route'. This may sound grand, but the fact that we did not have to wear safety boots on said tour indicates that we did not get in amongst things. However the tour showed the scale of the plant – even though it was largely concealed in large (boring), well insulated steel walled 'boxes'. The noise was as expected which made it much harder to hear Gordon compared with his wonderful comprehensive, easy to understand 'introduction' in the training room.

Other. We covered much more – eg carbon capture and storage, Net Zero, Irish Power Stations and the weak Irish grid, chimney problems elsewhere, the benefits of inertial generators compared with, albeit fast (80ms), static systems based on renewable sources

or batteries, safety, etc. But space does not permit more to be written here. In the group photo, Gordon is the one in the yellow tabard.

Visit

Wednesday 9th July 2025

Brighton Tram 53

Report by Derek Webb

According to the Brighton Tram 53 Society web site, *“Brighton Corporation Tramways ran for 38 years from 1901 until 1939, of the 116 tram cars built by the Corporation at their Lewes Road Depot, only 1, number 53, still survives. Number 53 was built in 1937 and after only 2 years of running, was sold to a West Sussex farm where she remained until the 1970s. For the next 3 decades she sat in a shed, untouched, until now...”*

In July a group of RCEA members visited the site at Chanctonbury where Tram 53 is being restored by the Brighton Tram 35 Society.



RCEA members at the Tram 53 restoration site at Chanctonbury



Tram 53 in May 2009 (taken from the Tram53 Society web site)

The view of our members was that the project had made good progress despite working in a cramped environment. There was surprise that the tram was generally in reasonable condition and the restoration had been done by a small band of volunteers.



Tram 53 today (taken from the Tram53 Society web site)

The Brighton Tram 53 Society's plan is to move the tram to Stanmer Park, Brighton, in 2026 and run it on its own track, all subject to the cooperation of Brighton City Council. At this stage they plan to move it up and down the track using a battery truck.

Member Articles

Projected UK Grid Maximum Demand

The Electricity System Operator (ESO) says that: *"Even if we all switched to EVs, we estimate (maximum) demand would only increase by around 10%. So we'd still be using **less power** as a nation than we did in 2002 and this is well within the range the grid can capably handle."*

That may of course be valid for domestic EV battery chargers, where the charging energy can be phased over around 8 hours at night – as long as the majority of owners don't want to use their EVs.

But it neglects over 600,000 roadside EV charging points - rated at least 100kW each – which may be installed by 2035 with loads that cannot be phased overnight. If 70% of them are in use, then they, plus a few million heat pumps, could take Maximum Demand (MD) to over 80GW, ie >60% above the current MD.

Add to that the loads of millions of new electric cookers, power showers, plus electric trains and a few data centres - plus 1.5million new homes - and the 10% increase in MD begins to look a bit optimistic.

Then consider the statement that the new loads are *"**well within** what the grid can capably handle"*. One data centre could have an MD of 40 or 50MW requiring new substation equipment, using up grid capacity, which may not leave much spare capacity for service stations with 25 x 100kW charging points.

That's not to mention the upgrading of 1,000s of local distribution transformers to accommodate the increased domestic loads, plus new housing estates. There will be many pinch points and the existing grid is surely unlikely to be fit for its new purpose, without a lot of upgrading.

Roger J. Arthur. CEng, MIET

24th April 2025

Initial quote taken from <https://www.nationalgrid.com/stories/journey-to-net-zero/electric-vehicles-myths-misconceptions>

Roger later (24/04/2025) commented: I believe that NESO should have carried out a range of system studies to prove that the capacity and stability of the proposed system will be up to the mark.

Later still (17/08/2025) Roger added: I would only add that whatever combination of solar and wind power is proposed, we will need around 80GW in CCGTs and SMR capacity, to keep the lights on when wind and solar intensity is near to zero, a condition which can last for a week or two.

A key question is *"since we have to have those conventional generators - with their stabilising rotational inertia - then why not run them continuously and more efficiently and dispense with wind and solar, with all of their subsidies?"*

End of Newsletter