

Gridline

Winter 2011

CHARGING AHEAD

The prospects for electric vehicles

ADAPT AND PROSPER

Delivering energy in a changing climate

INVESTING IN NATURE

Going the extra mile for wildlife

OUR HEROES

Keeping the memories alive at the National Memorial Arboretum in Staffordshire

PLUS: LONDON TUNNELS, PYLON COMPETITION, WIN A TWO-NIGHT HOTEL BREAK



National Grid's Land and Development Group

The Land and Development Group is responsible for acquiring all rights and permissions from statutory authorities and landowners needed to install, operate and maintain National Grid's electricity and gas transmission networks. The Group acts as the main interface for landowners who have gas and electricity equipment installed on their land. Your local contacts are listed below.

Electricity and gas

- North-west and Scotland
0161 776 0706
- South-east 01268 642 091
- South-west 01452 316 059
- East 0113 290 8235.

Wayleave payments

- For information on wayleave payments, telephone the payments helpline on 0800 389 5113.

Electricity emergency

- Emergency calls to report pylon damage to National Grid can be made on 0800 404 090. Note the tower's number – found just below the property plate – to help crews locate it.

Electric and magnetic fields

- For information on electric and magnetic fields, call the EMF information line on 08457 023 270 (local call rate). Website: www.emfs.info.

Gas emergency

- 0800 111 999.

Dial before you dig

- Before carrying out any work in the vicinity of gas pipelines, overhead power lines or underground electric cables, you should contact Plant Protection on 0800 688 588 so that searches can be made to determine the exact position of any National Grid assets.

Customer comments

- Write to Land & Development, National Grid House, Warwick Technology Park, Gallows Hill, Warwick, Warwickshire CV34 6DA. Or email ld.customercomments@uk.ngrid.com.



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08



Turn to page 20 for the result of last issue's photo competition

M&S giftcard competition winner

Congratulations to Staffordshire electricity and gas grantor David Grove of Church Farm, Harlaston, near Tamworth, who is the winner of Gridline's £150 M&S giftcard competition in the last issue.

The 200-acre family farm is contract farmed by neighbouring landowners.

"I'm now in semi-retirement, which means that I've got a bit more time to myself," said David. "This is how I came to enter the competition in Gridline. With Christmas coming up, it's fantastic to win this prize and my wife Wenda and I will put the giftcard to very good use."

Get in touch

Please contact Gridline if:

- You have any news that you think would be of interest to other grantors
- You think your business or hobby would make a good article
- You have any suggestions for topics you would like to see in Gridline.



Gridline is produced by Summersault Communications, 23-25 Waterloo Place, Warwick Street, Leamington Spa, Warwickshire CV32 5LA.

To contact Gridline, phone 01926 656 325,

email gridline@uk.ngrid.com or write to the address above.

Welcome to Gridline

With Christmas just a couple of weeks away, it's my pleasure to wish all our readers a very happy holiday period and a peaceful new year



A huge thanks to all of you who used the pre-paid form in the last issue of Gridline to tell us of your changes. We received such an enthusiastic

response that we're still processing the forms. So if your details are unchanged as yet, please be patient with us.

Our main feature on page 8 looks at how National Grid is taking 'climate adaptation' measures to prepare for the warmer, wetter winters, hot summers, and more extreme weather events that scientists say will become the norm.

Going the extra mile now to make equipment climate-change resilient, means that it will still be doing the job in 40 years' time, and we won't need to come back to replace it.

Our case study on page 12 looks at

the role that electric vehicles could play in achieving the UK's target of cutting CO₂ emissions by 80 per cent by 2050. Experts say that decarbonising transport is an essential step in this journey.

On page 14, we follow two green initiatives being supported by National Grid. The projects show how opportunities sometimes arise during essential works to support local initiatives that benefit the local environment and community.

Our grantor profile on page 16 focuses on the National Memorial Arboretum in Staffordshire, a wonderfully peaceful haven dedicated to the memories of those who have given their lives, been injured, or served their country in peace and war.

Dawn McCarroll
Editor, Gridline

GOT A STORY?

TEL: 01926 656 325, email: gridline@uk.ngrid.com

or write to: **Gridline, Summersault Communications, 23-25 Waterloo Place, Warwick Street, Leamington Spa, Warwickshire CV32 5LA.**

For more information...
Tel: 01926 656 325
email: gridline@uk.ngrid.com
www.nationalgrid.com

Newsline

The latest news from **National Grid** and its nationwide grantor network



BIG DIG: The TBM is lowered into position

Cleopatra arrives in London

A massive tunnel-boring machine is carving out a subterranean superhighway beneath London to ensure the capital continues to receive the power supplies it needs



CHRISTENING: Cub scout Libby O'Shea, who suggested the name Cleopatra

THE STATE-OF-THE-ART MACHINE, 100 metres in length, will dig the first phase of the London Power Tunnels' project tunnel from a site in Haringey.

The machine has officially been christened Cleopatra after a Tottenham Cub Scout Libby O'Shea, 9, won a National Grid competition to name it.

Cleopatra was lowered into a specially prepared shaft earlier this autumn and tunnelling began soon afterwards. Once up to full speed, Cleopatra will travel at a steady rate of 120 metres a week. Moving along a predetermined route, she will line the tunnel with pre-prepared concrete segments as she moves along, making it ready for the installation of 400kV high-voltage cables.

The new cables will connect National Grid's existing substations at Wimbledon, St John's Wood, Willesden and Hackney.

"By housing the cables deep underground, we are avoiding digging

up London's road network, which would risk major disruption," said David Luetchford, National Grid project manager. "It also means we can easily access the tunnels to carry out future maintenance work."

The tunnels will be up to 60 metres deep to avoid existing infrastructure, and will travel both under and above the London Underground in places. The future position of Crossrail (a new railway linking Maidenhead and Heathrow in the west, to Shenfield and Abbey Wood in the east) and Tideway (London's super sewer project) have also been taken into account.

London currently accounts for 20 per cent of the UK's electricity usage and demand is growing by three to five per cent a year. The 32km of new tunnels and their 400kV cables won't be in place and commissioned until 2018, but will have a lifespan of at least 50 years.

National Grid to use barges

ENVIRONMENTALLY friendly barges will be used to ship materials from a regeneration project at a former gas works site in Tower Hamlets, London.

Paul Mantell, commercial property manager for National Grid, explained: "The River Lea provides us with the perfect opportunity to use barges to remove the materials from the site, rather than adding to road congestion with lorries."

Gas manufacturing at the site ceased in the 1960s, but gas holders remain in operation.

Once the work is completed, National Grid will hand over part of the site to form the backbone of the new Lea River Park walkway between the Thames and the Olympic Park.



RIVER: Paul Mantell with one of the barges being loaded

SUPER GRID

A report by MPs on the Commons Energy and Climate Change Select Committee has concluded that a new European super grid would allow National Grid to balance supply and demand more effectively.

An integrated offshore grid would be needed for the UK, to connect the 80 to 280 wind farms in the North Sea planned by 2020. Current plans require about 60 separate landing points for the wind farms, but National Grid maintains the number could be halved if a coordinated offshore grid were adopted.



BE ONE IN A MILLION

2012 is the Queen's Diamond Jubilee and throughout this historic 60th anniversary year, the Woodland Trust's Jubilee Woods project has the objective to plant six million trees.

The Trust is hoping at least one million people will get involved in the project, which will improve the environment for people and wildlife.

Jubilee tree packs are available for communities and schools. More information at: www.jubileewoods.org.uk



CONTACT: Public feedback has informed the route plans at every stage

Hinkley Point nuclear connection update

NATIONAL GRID HAS promised to explore ways to lessen the visual impact of a new 400kV power connection to Hinkley Point C nuclear power station in Somerset.

The preferred route corridor was announced after two years of consultations with the public and other interested parties. Some 8,000 responses were analysed.

The preferred route corridor involves replacing an existing 132kV overhead line between Bridgewater and Avonmouth with a new 400kV overhead connection. As a direct result of feedback, elements of a second route corridor option were chosen for other sections.

Further detailed consultation will take place during 2012 with regard to route options, the location of new substations and areas where the connection can be placed underground.

"In their feedback, many people told us they wanted the cables put underground and, as we continue our consultation, we anticipate that the final plans will include some underground as well as overhead lines," said senior project manager Peter Bryant.

i For more information...

go to: www.nationalgrid.com/hinkleyconnection.



One minute interview

Michael Dutton, lands officer south-east

Background: I joined National Grid in July 2010 as part of the trainee lands officer scheme, after completing a four-year building surveying degree at Coventry University.

Current focus: Working on a major overhead refurbishment project in Norfolk – the largest being delivered in the region this year.

What do you like about your job? No two days are the same, and each project has different challenges regardless of the size of the job.

Dream job: A top-flight architect, having the chance to say: 'I designed that', and knowing that it could be enjoyed by many for hundreds of years.

Ideal dinner guest: Boxing legend Muhammad Ali – the man who used to 'float like a butterfly and sting like a bee'.

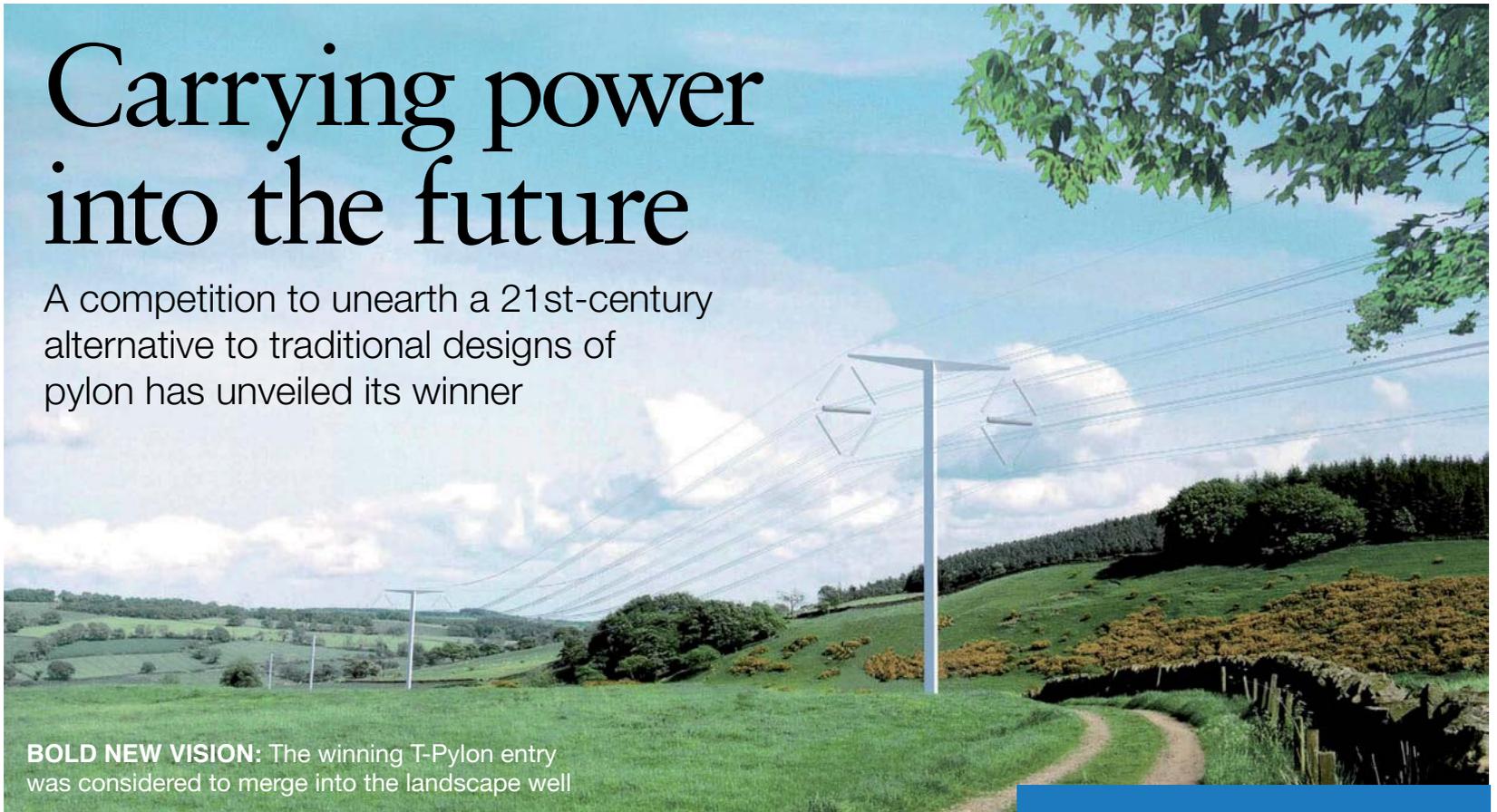
Favourite film: Snatch, directed by Guy Ritchie, because it's so full of humorous lines.

If you won the lottery, what would you buy? Either a yacht or a helicopter – boys' toys!

Pet hate: Extremely 'slow' over-cautious drivers and poor drivers who sit far too close to the steering wheel.

Carrying power into the future

A competition to unearth a 21st-century alternative to traditional designs of pylon has unveiled its winner



BOLD NEW VISION: The winning T-Pylon entry was considered to merge into the landscape well

AN INNOVATIVE T-SHAPED DESIGN has won a competition to find a new electricity pylon design, run by the Department of Energy and Climate Change in conjunction with the Royal Institute of British Architects and National Grid.

The T-Pylon design from Danish company Bystrup beat five finalists (below) in the contest, which attracted 250 entries overall.

Nick Winser, executive director of National Grid, said it would be working with Bystrup to develop the design further. “In the T-Pylon, we have a design that has the potential to be a real improvement on the steel lattice tower. It’s shorter, lighter, and the simplicity of the design means it would fit into the landscape more easily.”

National Grid will also give further consideration to the Totem and Silhouette

designs, which both had ‘strong visual appeal and characteristics that could work well in different landscapes’.

A significant number of new transmission routes are needed in coming years to connect new wind farms and nuclear power plants.

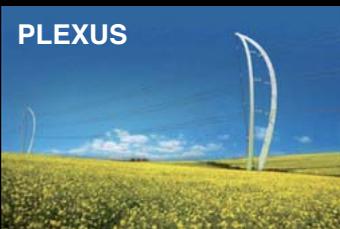
In September, National Grid announced a new approach to the design and routing of transmission towers. After concluding a six-month consultation, the company said it would place more emphasis on mitigating their visual impact – in balance with the need to minimise household energy bills.

A range of mitigation measures will be considered on a case-by-case basis, such as undergrounding electricity cables, subsea cables, rerouting round sensitive areas of special landscape value, and alternative pylon designs.

IT’S A FACT...

- There are 22,000 towers on National Grid’s transmission network in England and Wales.
- The traditional steel lattice tower stands some 165ft high and weighs 30 tonnes.
- Britain needs the equivalent of 20 new power stations by 2020.
- The present style of tower dates from a 1927 competition.
- Running cables underground costs from £15-£20 million a mile – 10 times more than overhead lines.
- To meet climate change targets, 30 per cent of electricity supplies must come from renewables by 2020.

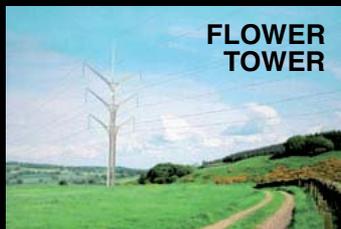
PLEXUS



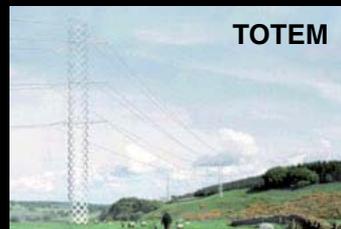
SILHOUETTE



FLOWER TOWER



TOTEM



Y-PYLON



Project watch

A round-up of current and forthcoming projects around the country

1 COTTAM TO WEST BURTON OVERHEAD LINE REFURBISHMENT

WHEN: August to October 2011

WHY: Over the past two years, National Grid has been upgrading the existing Cottam 400kV substation – an important hub of the nation’s electricity transmission system – to enable improved power flows in this part of the country.

WHAT: The 7km Cottam to West Burton section has been restrung with a new type of conductor, which relies on a carbon fibre core, rather than steel, for its tensile strength. All conductors heat and expand when increased electrical load is carried, giving rise to conductor sag. However, because carbon fibre is less prone to heat expansion than steel, it enables a line to run at a higher operating capacity without any danger of sag infringing safety clearances with the ground.

3 HUTTON SUBSTATION EXPANSION

WHEN: Late summer 2012 (subject to planning permission)

WHY: National Grid plans to install new equipment (‘series compensation’ capacitor banks) at Hutton substation in Cumbria. The upgrade will enable an extra 1,000 megawatts (MW) of electricity to pass through existing overhead power lines – enough to power around 800,000 homes.

WHAT: Raising the capacity will enable an increased transfer of green renewable energy between Scotland and England, helping to meet climate change targets. Overhead power lines from Harker, near Carlisle, to Hutton, and from Hutton to Heysham, on the west Lancashire coast, will be refurbished in 2013 as part of the planned upgrade in the region.

2 CELLARHEAD TO CARRINGTON OVERHEAD POWER LINE REFURBISHMENT

WHEN: October 2011 to Summer 2012

WHY: National Grid needs to refurbish more than 180 spans of overhead line between Cellarhead, Staffordshire and Carrington, south of Manchester, as well as another 20 towers that branch off towards Macclesfield.

WHAT: The line crosses three counties, including rural parts of Cheshire and Staffordshire, as well as more built-up areas near Manchester. National Grid will keep landowners and residents near to the line updated about the project. Ecological studies were conducted, to ensure any impact on the local area is minimised. Some tower steelwork replacement began in October, with conductors, fixtures and fittings due to be replaced in the spring and summer of next year.

4 FAWLEY TO LOVEDEAN OVERHEAD LINE REFURBISHMENT

WHEN: March to July 2012

WHY: Full refurbishment is required on the 400kV overhead line.

WHAT: The 22.4km route, with 65 towers, passes over a mixture of residential, business and rural land. The route crosses valuable ecological sites, including Botley Wood, a Site of Special Scientific Interest, which hosts National Grid’s substation. Vegetation clearance is scheduled to be completed by February to avoid disturbance to nesting birds and dormice (a protected species). Fittings-only refurbishment is also planned on 62 towers from Fawley to Nursling (October 2012), and on a single circuit from Nursling to Manningham, involving 115 towers (September 2012).



Future-proofing for a changing world

With climate change likely to cause increasingly challenging weather conditions in the future, how will National Grid ensure that homes continue to enjoy uninterrupted supplies of electricity and gas?

THE EARTH'S CLIMATE IS CHANGING, and the overwhelming majority of scientists agree that this is largely due to rising concentrations of heat-trapping greenhouse gases in the atmosphere as a result of human activities.

The burning of fossil fuels has contributed to a 37 per cent increase in carbon dioxide entering the atmosphere since 1850.

Rising global temperatures are already altering weather patterns. According to the authoritative UK Climate Projections 2009 (UKCP09), the country will experience hotter and drier summers, and warmer and wetter winters over the coming decades, as well as long-term rises in sea levels. There will also be more flooding, faster coastal erosion, more heatwaves, droughts and extreme weather events.

CHANGES AND CHALLENGES

Certain areas, such as floodplains, estuaries and large urban areas, may face more pronounced changes and challenges. For example, large urban areas are more vulnerable to hot summer days and nights, due to the urban heat island effect.

Responding to climate change requires two kinds of action, explained Steve Wallace, head of climate change and environment at National Grid. "To put it

simply, dealing with the causes of climate change is mitigation, dealing with the consequences is adaptation."

Mitigation efforts in the UK are focused on reducing greenhouse gases by 80 per cent by 2050, as required by the 2008 Climate Change Act.

The British government is investing £200 billion in new infrastructure over the next five years to decarbonise the economy, particularly in energy and transport, and introduce more renewable energy.

"But at the same time, there is a need to plan and adapt to the climate change that we cannot avoid due to past greenhouse gas emissions, so that we can reduce potential disruption by making assets more resilient, and deal with the remaining consequences," added Steve.

TRIED AND TESTED

In February 2011, National Grid was among seven critical, national infrastructure organisations to produce climate change adaptation reports for the government, detailing how they are assessing and acting on the risks from a changing climate.

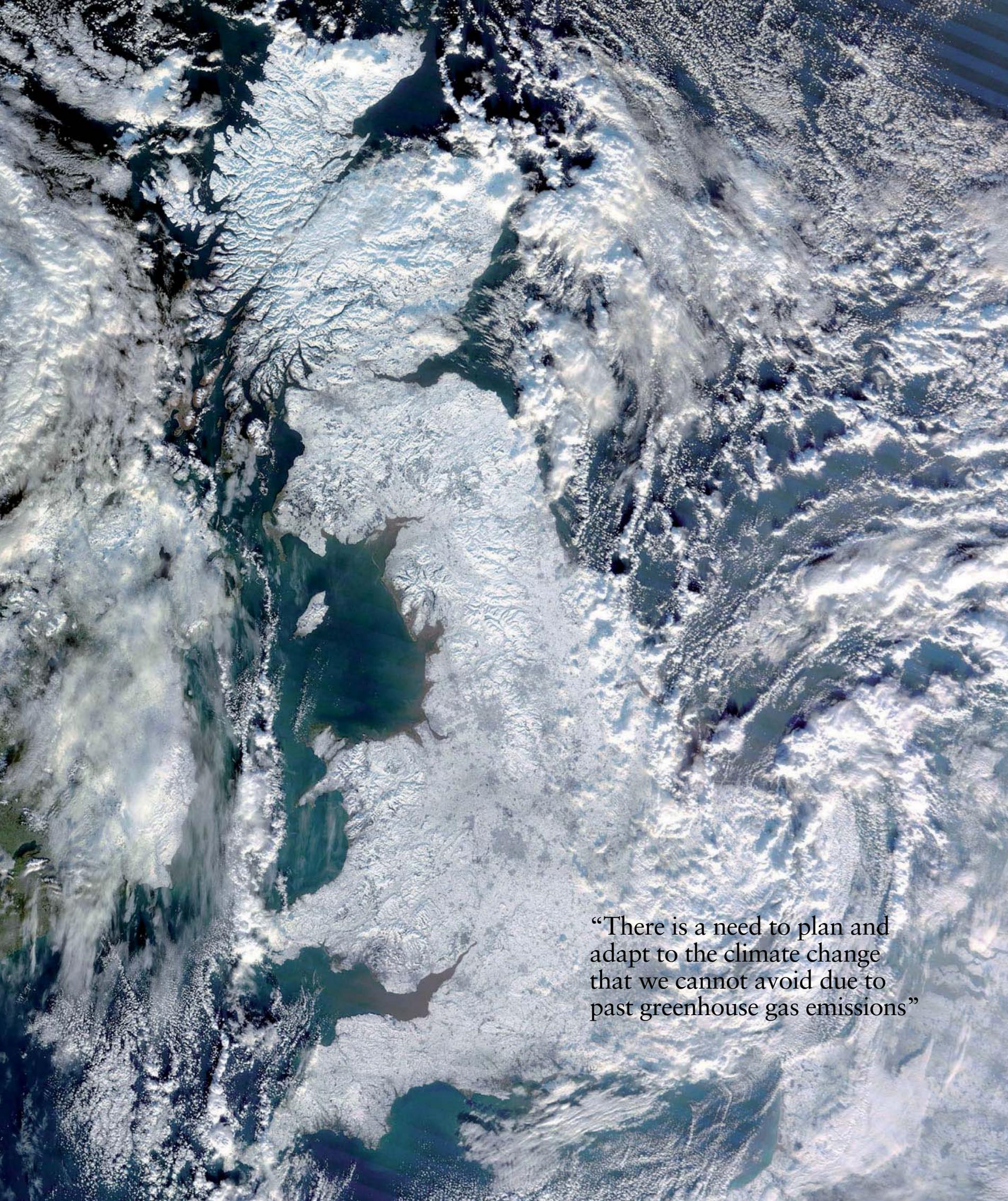
The reports on the gas and electricity networks concluded that they have a high degree of resilience to climate change.

"We have invested heavily in research and development over the past five years with climate scientists at the Met Office Hadley Centre, The Environment Agency and energy network operators, to better understand and prepare for the impacts of climate change," said Gary Thornton, asset strategy engineering manager, electricity transmission, at National Grid.

"Our electricity infrastructure is designed to international standards, using equipment tried and tested in climates around the world that are far more challenging than those



CARBON COST:
Burning fossil fuels
has contributed to
climate change



“There is a need to plan and adapt to the climate change that we cannot avoid due to past greenhouse gas emissions”

that are projected for the UK in 2080.”

Because they are underground, gas pipelines are protected from many of the effects of climate change.

National Grid chose to test its assets against the worst-case scenario for greenhouse gas levels by 2080, as modelled by climate change prediction data from UKCP09. In this ‘least-likely’ scenario, summer average temperatures rise by up to eight degrees, heavy rainfall more than triples, and sea levels rise by 43cm.

Key climate change vulnerabilities for the energy sector were identified as higher summer temperatures, an increased intensity of rainfall, and higher flood risk.

A need for more research was indicated for low wind speed (dead calm) events with high ambient temperatures, and an increased frequency and intensity of lightning, snow, sleet, blizzard, ice and freezing fog.

CASCADE FAILURE

Another key focus for government is how climate change poses a risk to the so-called ‘interdependencies’ between critical infrastructure organisations in the water, energy, transport and information communications technology (ICT) sectors.

One concern is ‘cascade failure’ – where the collapse of one aspect of infrastructure, such as a substation, could lead to a power cut, which has a knock-on effect on, say, a water treatment plant. In turn, this could threaten water supplies.

“The electricity transmission system has a high degree of independence,” said Gary. “We have back-up battery systems at all substations, diesel generators at all but the smallest substations, and a completely independent communications system for



FLOOD RISK: Concentrated episodes of rainfall pose a threat of flash flooding



CITY HEAT: Higher summer temperatures can create a heat-sink effect

“We are future-proofing our equipment, so we don’t have to redo it”

remote substation control and protection.

“In the rare event of an outage, the power cut tends to be localised, supplies are usually rerouted to maintain services, and there’s normally no threat to the whole system.”

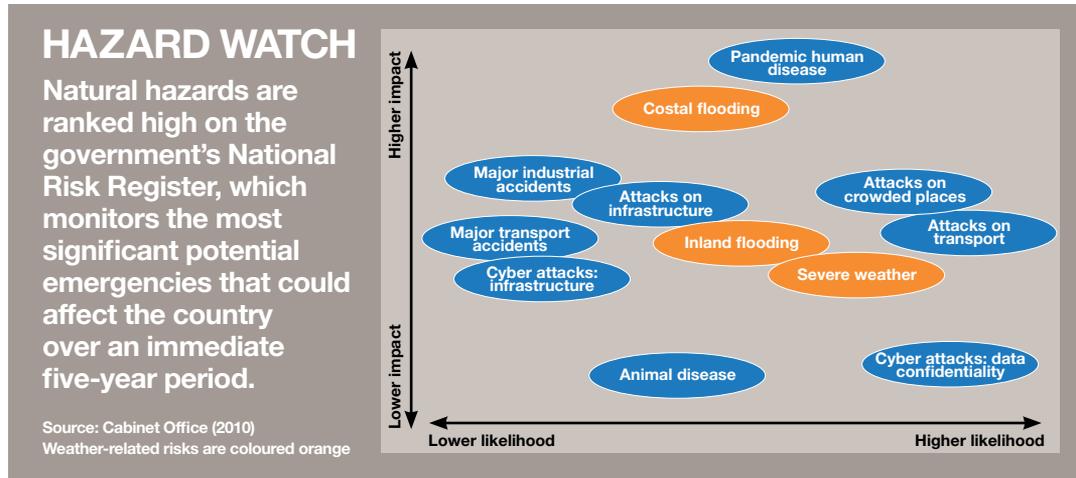
National Grid’s transmission networks maintain world-class standards, with reliability scores of 99.9999 per cent for electricity and 100 per cent for gas.

This overall resilience was evident in the 2007 floods, some of the worst in living memory, which affected the South Midlands and Yorkshire. Despite part of Walham

substation being inundated, National Grid engineers ensured continued supplies to Gloucestershire and Worcestershire.

Going forward, huge future investment in networks to connect new sources of energy and increase energy security are likely to provide ongoing opportunities to accommodate adaptation to climate change.

“The overall message is that we are building the infrastructure of tomorrow, with a view to operating it for the next 40 years, and being resilient to future climate change,” said Steve. “We are future-proofing our equipment, so we don’t have to redo it all at a later date.”



i For more information...
on National Grid’s Climate Change Adaptation reports see: www.nationalgrid.com/corporate/Our+Responsibility/News/newscadaptation.htm.



OUT OF HARM'S WAY

The new Tilbury 400kV GIS substation is built in the River Thames floodplain.

"The GIS switchroom is raised on 4-metre-high stilts, designed to protect against a worst-case tidal surge in the River Thames," said site manager Nick Walsh.

"Because of the soft floodplain deposits, the structure is supported by 500 piles, driven through silt and gravel layers into firmer chalk formations 26.5 metres below."

Whatever the weather

National Grid's climate adaptation reports detail the most likely impacts on its infrastructure from 'worst-case scenario' climate change in the coming decades

HIGHER SUMMER TEMPERATURES

- Warmer air temperatures in summer may have the effect of limiting the load (current) that can be carried by overhead transmission lines, leading to a marginal lowering of overall system capacity. But this will be more than compensated for by the major upgrading and expansion of the grid over the coming years to enable a low-carbon future and a smarter grid.
- Increased demand (for air conditioning etc) is likely to result in a flatter seasonal demand curve for electricity, making it harder to take circuits out of service in summer for planned maintenance. Equipment improvements are being targeted to deliver better fault rectification and reduce maintenance requirements.
- Changing supply and demand flows on the gas transmission system (including increased east-west transfers) means that some compressor stations not designed to operate in summer months now do so. Improved cooling systems to handle hotter summer weather will be phased in as they are required.

MORE SEVERE AND FREQUENT FLOODING

- Flood mitigation work is being prioritised at 11 existing substation sites that are at risk of a 1 in 100-year fluvial (river) and tidal flood event. Assessments are also under way on the risks posed from other sources of flooding, including pluvial (extreme rainfall). A 1.7km mobile flood defence system can be deployed to substations anywhere in the country within 12-24 hours. All new substations and gas compressor stations are designed to be resilient to a 1 in 1,000-year flood event.
- Fifty-seven substations are potentially vulnerable to flooding, due to their co-location with power stations. No immediate threats are foreseen if the Environment Agency maintains flood defences to existing protection standards.
- Gas pipelines may potentially be at risk from coastal and river erosion, and ground movements arising from increased rainfall and flash flooding. Older iron pipes in gas distribution are being replaced gradually with polyethylene versions resistant to subsidence. More reliance will be placed on tunnelling and directional drilling in construction projects at river crossings, as opposed to trenching. It is easier to bury pipelines in the ground by this method and so river erosion is less likely.

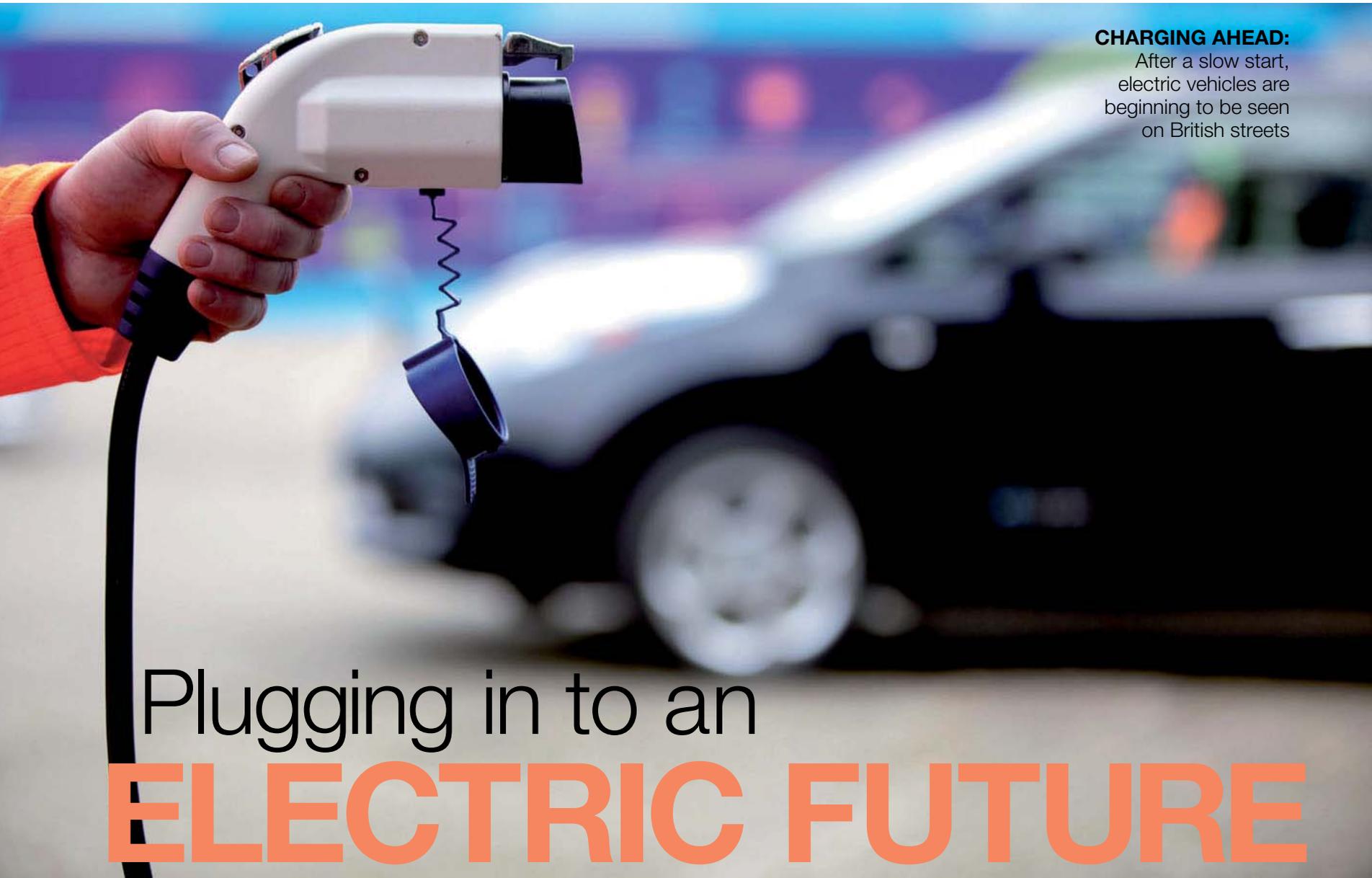


EMERGENCY: Temporary flood defences can be deployed at substations



IT'S A FACT...

- April 2011 was the warmest on record (since 1910).
- The summer floods of 2007 cost the UK economy more than £4 billion.
- Since the 1970s, average temperatures for central England have risen by 1°C.



CHARGING AHEAD:
After a slow start, electric vehicles are beginning to be seen on British streets

Plugging in to an **ELECTRIC FUTURE**

They're quiet in operation, free from noxious exhaust fumes, and could play a key role in cutting carbon emissions and tackling climate change

NISSAN LEAF ELECTRIC VEHICLES (EVs) are the perfect solution for National Grid staff in London, who are working on an eight-year project to construct tunnels for a new high-voltage cable network.

Project inspectors are using five of the vehicles to travel between tunnel shaft sites in and around the capital. The vehicles are recharged at National Grid's sites in Willesden and Hackney.

"They're ideal for short trips on congested streets," said Paul de Jong, safety and sustainability manager at National Grid. "They're exempt from congestion charges,

are practical, and have low running costs."

Electric vehicle is the umbrella term for vehicles powered, in part or in full, by a battery plugged directly into mains electricity, such as pure-electric, plug-in hybrid and extended-range electric vehicles.

HUGE SHIFT

Road transport contributes about 22 per cent of the UK's CO₂ emissions, and its electrification (along with heating) is seen as an essential step in achieving an 80 per cent cut in carbon emissions by 2050.

National Grid's chief executive Steve

Holliday said there would eventually need to be 'a huge shift on to electric road transport to meet carbon reduction targets'. He added that there could potentially be a million EVs on the road as early as 2020.

Since January, subsidies of up to £5,000 have been available for purchasers of electric or plug-in hybrid vehicles. Owners pay no road tax or congestion charges (in London) and qualify for free parking in some areas. There are also plans to boost the number of plug-in charge points in London and other cities from about 1,000 to 11,000 by 2013.

Despite this, take-up has been sluggish, with EVs currently accounting for just 2,000 of the 28.5 million vehicles on the roads. Experts blame a lack of choice, high upfront prices, as well as the limited range of vehicles and a relative scarcity of charging points.

EVs have zero tailpipe emissions when



CUTTING CARBON: Zero tailpipe emissions, but take-up is slow

powered solely by their batteries, but are only as low-carbon as the electricity that charges them. For that reason, some of the greenest diesel cars are currently comparable to EVs in their 'well to wheel' emissions.

But if 40 per cent of electricity is sourced from low-carbon sources by 2020, as the government hopes, significant emissions savings over fossil fuel cars are likely.

CHALLENGES

If in the 2020s there are up to 1.5 million EVs on the road, some experts believe the increased demand for electricity could pose challenges and opportunities for National Grid and the distribution networks in balancing supply and demand.

Initially, the impact is expected to be more significant for distribution networks as clustering and hotspots of EVs emerge, causing local demand spikes.

"Smart meters in the home (mass roll-out from 2014), in combination with intelligent charging systems, will be needed at that time," agreed Mike Edgar, business strategy development manager at National Grid.

"The smart meter and a smarter grid will enable local distribution networks and energy suppliers to manage large numbers of EVs by enabling demand-side response (DSR) of consumer behaviour – interrupting, delaying or bringing forward recharging to avoid grid imbalances."

For example, owners could be incentivised through lower pricing tariffs to charge vehicles overnight at times of lower demand.

Smoothing out power demand and generation also means that extra fossil fuel generation doesn't have to be enlisted to meet peaks in demand (saving carbon

"Further into the future, Vehicle-to-Grid or 'reverse charging' technology could become valuable"

emissions). And it would help accommodate the intermittent nature of renewable energy such as wind farms.

Further into the future, Vehicle-to-Grid (V2G) or 'reverse charging' technology could become valuable. In this scenario, the battery becomes an electricity storage mechanism, acting as an energy buffer for balancing services, enabling energy to be transferred to the grid at times of peak demand.

STORED POWER

Instead of disconnecting wind turbines when they risk overloading the grid, for example, V2G systems could store that power in parked plug-in EVs and retrieve it when the wind dies down.

A report produced by National Grid and Ricardo earlier this year suggests that by 2020, demand-side management alone could provide up to 10 per cent of the UK's daily balancing service requirements.

However, the upfront cost of the two-way charging system needed for V2G would be prohibitive in most cases, except for where there are fleets dedicated to industrial or local deliveries, for example, where the costs could be shared across many vehicles.

"The speed at which EVs achieve mass penetration in the UK is open to debate, but it seems likely they will become an increasingly important element in our low-carbon energy future," said Mike.



POWER TO THE GRID: Electric vehicles could even help to balance the grid



EFFICIENCY

A battery and electric motor is more efficient than an internal combustion engine (ICE), with about 80 per cent of the stored energy driving the wheels in contrast to ICEs (20 per cent efficient).



RANGE

The range of EVs is limited to about 100 miles on a full charge. However, the average daily distance travelled by British drivers is just 25 miles, and the length of a single journey 8.6 miles.

RUNNING COSTS

The AA calculates EVs can be run for about 2p a mile, against 14p a mile for a similar size diesel or petrol car.

CHARGING

An EV battery that has a 100-mile range takes 6-8 hours to recharge from a domestic 3kW power supply, but fast-charge posts at service stations cut this to about 30 minutes. The typical cost to recharge is around 3p per mile, compared with fuel costs of 16p per mile for an ICE vehicle.



i For more information... read Electric Vehicles: charged with potential (Royal Academy of Engineering May 2010) at www.raeng.org.uk/news/publications/list/reports/Electric_Vehicles.pdf. Also see the Electric Car Guide 2011 (The Society of Motor Manufacturers and Traders) at www.smmmt.co.uk/.

CUTTING EDGE:
Biodiversity ranger
Ed Tucker is leading
the clearance works

For the COMMON GOOD

An overhead line project in West Glamorgan has provided an opportunity to restore an overgrown area of common land

NATIONAL GRID IS HELPING TO fund a three-year project to restore traditional grazing land and encourage biodiversity on the commons of Cefn Drum and Graig Fawr, a large open area of mixed upland heath and semi-improved grassland habitat, above Pontarddulais, near Swansea.

The Building Biodiversity project is being managed by PONT (a not-for-profit organisation that promotes conservation grazing), on behalf of the West Glamorgan Commoners Association.

The aim is to clear bracken, gorse, purple moor grass, soft rush and invasive rhododendron from extensive areas of the 2,000-acre common, and restore conservation grazing in its place.

National Grid's funding contribution was key in triggering £250,000 of grants for the project from Waste Recycling Environmental (WREN), Environment Wales, the Countryside Council for Wales, the City and Council of Swansea, the Environment Agency Wales and the Gower Society.

Major steelwork replacement works have recently been completed on the Pembroke to Swansea 400kV overhead line, which crosses the commons.

"Last year, we needed to clear rhododendron from around the base of four towers to access the sites," said Rob Miller, lands officer south west. "The opportunity to support PONT in this project meant that we could address the vegetation management issue, and help provide something of lasting environmental value and benefit to the local community.

"The commoners have grazed the land for generations under licence from the landowner, the Duke of Beaufort," he

"The project is helping to engender a real sense of ownership and pride"



NATURAL MANAGEMENT: Grazing sheep help to keep vegetation in check



CUTTING BACK: Ed gets to grips with another clump of invasive rhododendron

added. "Many of them own land on other sections of the route and so are grantors in their own right."

Ed Tucker is the biodiversity ranger leading the project. "Our efforts this year are concentrated on clearing 70 acres of dense and scattered rhododendron, and creating 20-metre buffer zones to stop the seed from spreading," he said.

"After the clearance, feeding blocks encourage cattle and sheep to graze in the area. They churn up the leaf litter with their hooves, enabling grass and other plants to come through, which in turn encourages a diverse range of insects and mammals."

RESTORING GRAZING

Next year, the focus will be on foliage spraying to prevent regrowth. Bracken will also be rolled annually using a tractor-based attachment, which crushes the plant, causing it to lose vigour over time and die back.

There are animal husbandry benefits to the project, too. Ed said: "If a sheep becomes sick, its instinct is often to hide away in the undergrowth. But the clearance work will make it much easier to spot these animals in the landscape."

Restoring grazing will also help tackle the site's long history of antisocial activities, including fly-tipping, fires, and the illegal use of scrambling bikes and off-road vehicles.

"Volunteers from the local community are helping with the clear-up, and there is a series of talks and walks planned to increase awareness about the project and encourage more people to get involved," said Ed.

"The project is helping to engender a real sense of ownership and pride in restoring the land's natural habitat," he added.

i For more information... go to: www.pontcymru.org/en/projects/building-our-biodiversity-project/.



A HELPING HAND FOR RARE TANSY BEETLE

Engineers carrying out works on a gas pipeline in Yorkshire recently joined forces with the Environment Agency on a project to extend the habitat of the tansy beetle

Excavations were needed on a high-pressure pipeline where it crossed the River Ouse at Riccall, near York.

An 'inline' inspection – in which a device travels through the pipeline in the flow of gas to record potential problems – had indicated a possible surface dent.

"In fact, the scarring was superficial, and only required a reapplication of protective paint," said Iain McEwing, National Grid's project supervisor.

PRIORITY SPECIES

The excavations took place in a strip of grazing marsh within the known range of the tansy beetle. This beautiful iridescent green beetle is confined to a 30-mile stretch of the River Ouse, and is a UK Biodiversity Action Plan priority species.

The Environment Agency, which owns the land, has an ongoing project to increase the availability of the tansy plant, which the beetle needs for its food and reproductive cycle.

CONSERVATION MANAGEMENT

"In mitigation for any negative impacts on the habitat, we erected three stockades at intervals along the riverbank to protect clumps of tansy plant from cattle grazing," said Iain.

Martin Fuller, biodiversity officer for the Environment Agency, said that it was hoped new colonies of the beetle would establish on the floodplain. "The beetle prefers the water-logged conditions of the riverbank, and the stockades are 200 metres apart because that's the maximum distance they will walk," he added.

"The new 700-metre strip of protected habitat will make a significant contribution to the Yorkshire site's conservation management."

LEST WE FORGET

In the space of just a decade the National Memorial Arboretum in Staffordshire has become a national focus for remembrance, drawing thousands of visitors



TRIBUTE: Charlie Bagot Jewitt, CEO of the National Memorial Arboretum

AS THE NUMBER OF WORLD War veterans diminishes with each passing year, it becomes ever more important that there are reminders about the personal sacrifices made on the nation's behalf to preserve its freedoms and way of life.

Those reminders are everywhere you turn at the National Memorial Arboretum, at Alrewas, near Lichfield, which this year marks its 10th anniversary.

The Arboretum, a National Grid gas grantor, is the UK's centre for remembering and paying tribute to all those who have served their

country in peace and war. A registered charity, it opened to the public in 2001 and has been managed by The Royal British Legion since 2003.

Set in 150 acres of tranquil wooded parkland on the banks of the River Tame, on land previously used for gravel workings, it's a peaceful and emotive spot with 50,000 maturing trees and 200 memorials.

"People come here to pay their respects to loved ones, learn about the past and reflect on the human cost of war," said Charlie Bagot Jewitt, who is the Arboretum's chief executive.

"The memorials are both deeply moving and spiritually uplifting. The Arboretum importantly also celebrates the achievements of so many through the years who have made the country what it is."

The concept of the Arboretum is very much that of a living memorial, set in a beautiful mosaic of woodland glades, wetland areas and wide-open spaces with a variety of habitats for wildlife.

Because it's an arboretum, trees, plants, gardens, walkways and planted avenues also act as tributes, along with the familiar sculptures and memorials.

There is, for example, a Garden of the Innocents, for children affected by conflict, which includes a tree dedicated to Anne Frank.

While some trees are individually dedicated, there

are also mass plantings – including 2,535 oaks representing the same number of flagged merchant navy vessels lost to enemy action in World War II.

A large proportion of the memorials is to the armed forces, including those dedicated to veterans of particular campaigns or battles (Gallipoli, Normandy, Burma, etc), or marking the comradeship within a group or unit.

But they are joined by others for the police, fire brigade, ambulance services, civilian victims of war, charities, and local and overseas organisations.

The sheer variety of memorials is impressive, ranging, for example, from the International Military Music Society to the Women's Institute, Royal National Lifeboat Institution, Stillbirth and Neonatal Death Society and The Boy's Brigade.

ADDED POIGNANCY

New memorials are added almost weekly, including, in July, one dedicated to the Bevin Boys – the 48,000 young men, many of them conscripts, who joined regular miners down the pits in the dangerous, but vital, work to keep supplies of coal flowing in WW2.

In the centre of the park on a raised mound stands the striking Armed Forces Memorial, completed in 2007. The massive white walls, clad in Portland stone, bear the engraved names of 16,000 servicemen and servicewomen killed on duty or as a result of terrorist activity in more than 50 operations and conflicts since 1945. Added poignancy is provided by the blank panels waiting to be filled.

The memorial is particularly important for the many families and friends who have no grave to visit, or who remember those in graves in far-off places. Names are added annually to the giant walls.

"Behind each inscribed name there are people who loved them and who live with the pain and consequences of their loss every day," said Charlie. "The memorial provides a tranquil setting where families and friends can be at one with their thoughts.

"Many more people today survive attacks or bombs, although often with lifelong injuries. So it's just as important to remember these individuals as it is to remember those that did not return," he added.

Another landmark structure is the Millennium Chapel of Peace and Forgiveness – the only place in →

"The memorial provides a tranquil setting where families... can be at one with their thoughts"



REMEMBERING THEM: (Clockwise from top left) The Bevin Boys Memorial; adding another name; the Royal Corps of Signals memorial; the Auxiliary Territorial Service Statue; honouring their names on Remembrance Day; the Royal Air Force Association Remembrance Garden; the approaches to the Armed Forces Memorial



“One of our aims... is to communicate the meaning and importance of remembrance”

the UK where a two-minute silence is observed every day of the year. At 11 o'clock each day, a light shines on to the altar from the bearing and elevation of the sun at 11am on 11 November, Armistice Day.

£8 MILLION APPEAL

Two years ago, the Arboretum launched an £8 million Future Foundations Appeal to fund new public facilities, including a larger function room, additional exhibition space and a world-class remembrance learning centre. The improvements will enable the Arboretum to accommodate an expected rise in the number of visitors from the current figure of around 300,000 a year to more than 500,000.

“One of our aims is that the Remembrance Learning Centre will help to communicate the meaning and importance of remembrance to the public in a way that is fresh and contemporary for the Facebook and Twitter generation,” said Charlie.

The Arboretum has been working with more than 40 academics, including historians, architects, art historians and psychologists, to consider all aspects of remembrance from a multidisciplinary perspective.

“The research will be fed back into the learning centre, helping people to explore what remembrance means, why it is important, and how it has changed in meaning for each generation.”

One thing is certain, while memories fade over time, the memorials at the National Memorial Arboretum will ensure that the exploits and sacrifices of countless brave men and women will continue to be recalled by future generations.

i For more information...

The National Memorial Arboretum and its visitor centre are open daily throughout the year and there is no admission fee. Go to: www.thenma.org.uk.

SHOT AT DAWN

One of the most moving memorials at the Arboretum is dedicated to the 306 soldiers who were shot for cowardice or desertion during WWI. Many of these men – some as young as 17 – would today be considered to be suffering from post-traumatic stress disorder. The memorial, by Andy De Comyn, depicts a young soldier blindfolded, modelled on the likeness of Private Henry Burden, who lied about his age to enlist and was shot for desertion. Nearby are 306 stakes with the names and ages of those executed. The monument stands at the most easterly point of the Arboretum, where it is the first to be touched by the morning sun.



MEMORIAL: The Shot at Dawn memorial (left); each stake is dedicated to a soldier (above); saluting fallen comrades (below)



IT'S A FACT...

- The Royal British Legion meets a third of the annual £1.5 million running costs and another third is provided by Ministry of Defence grants.
- The National Memorial Arboretum raises the remaining £600,000 by hosting up to 200 events a year and generating income from its shop, restaurant and visitor donations.
- In addition to 50 permanent staff, the Arboretum relies heavily on about 150 dedicated volunteers, aged from 14 to 90.
- The Arboretum has plans to more than double in size to 300,000 acres by 2026, using land released by the phased completion of gravel and sand extraction operations in the vicinity.

Out&About

The latest news from **National Grid** and its nationwide grantor network

First in his field

NATIONAL GRID GAS GRANTOR

Colin McGregor from Coldstream Mains, in Berwickshire, has been named UK arable farmer of the year by judges at the prestigious Farmers Weekly Awards.

Colin and his team manage eight farms set in 7,000 acres in the Scottish Borders, growing wheat, oilseed rape, spring beans, vining peas, barley and potatoes.

Despite the size of the operation, the judges were impressed by the attention to detail and consistently high standards.

Colin was an early adopter of Precision Farming techniques. Using Global Positioning Satellite technology, fields are monitored and analysed to enable the variable application of inputs, such as seed, fertiliser and lime, to maximise yield, while minimising waste and cost. Automatic machine steering and control systems are also used.

Caring for the environment is another priority – the farms include wildlife margins in many of the fields. The judges also praised Colin's work with schools and farmer groups, and his active involvement in the community – helping out as required, for example, moving snow from local roads and erecting Christmas lights.

Photograph: Jim Varney/FW



OUTSTANDING:
Colin McGregor,
the UK arable
farmer of the year



FLEECE ALERT

Grantors are asked to ensure crop-protection sheeting is firmly secured to the ground, and to continually monitor its condition.

“In a recent incident (above) a horticultural fleece about 250 metres long, blew into 400kV overhead power lines and wrapped itself around the bottom phase of a circuit,” said Doug Lockwood, delivery manager overhead lines.

“The material trailed back across the field, creating a danger of electricity conducting to the ground, with potentially hazardous results if anybody came into contact with it.”

REMEMBER

If you see anything hanging from an overhead line:

- alert others in the vicinity of the danger
- call the 24-hr emergency number (0800 404 090) and, if safe to do so, give the nearest tower ID number (found on the tower's property plate).



EARLY LEARNING:

Getting to grips with tower design

Inspiring the 'live wires' of tomorrow

A UK government estimate forecasts that 58 per cent of all new jobs in the next 10 years will require a STEM (science, technology, engineering or mathematical) background.

Inspiring the technologists and engineers of the future is what the Imagineering Fair is all about. This year's event was held at AIRBASE, Coventry airport.

Visitors to the National Grid stand were able to immerse themselves in a variety of fun, hands-on

activities, including a 'design a pylon' competition – with prizes for the top 10 entries. They were also able to explore a working model grid system, complete with towers and houses that lit up.

Employee volunteers and members of National Grid's graduate scheme, together with year-in-industry students and university students on the Power Academy scheme (an eight-week summer placement) were on hand to guide the young visitors.

LastWord

Contact details
Tel: 01926 656 325
Email: gridline@uk.ngrid.com
Website: www.nationalgrid.com

Your chance to enter two great competitions

Photo competition



A friendship sealed

Congratulations to electricity grantor Joan Yates of Ansty, Leicester – the winner of last issue's photo competition on the theme of 'wildlife' for this stunning photo, taken at a location near Cromer, Norfolk.



Win a Marks & Spencer giftcard

The lucky winner of this issue's competition will receive a Marks & Spencer giftcard preloaded with £150.

Similar to a credit card in size, M&S giftcards can be spent at more than 600 M&S stores in the UK or online on fashion, food, entertainment, home, accessories, and more.

Giftcards are valid for 24 months from the last transaction and the balance cannot be converted back into cash. They cannot be accepted for made-to-measure shirts or large appliances.

To be in with a chance of winning an M&S giftcard, simply answer the following question correctly:

Q WHAT PERCENTAGE OF THE UK'S TOTAL CO₂ EMISSIONS ARE CONTRIBUTED BY ROAD TRANSPORT?

Send your answer to Gridline M&S Competition, 23-25 Waterloo Place, Warwick Street, Leamington Spa, Warwickshire CV32 5LA. Please note, you must be a grantor to enter. Closing date is 08 February 2012.



Win a luxury hotel break

Enter Gridline's competition to win a two-night stay at The Belfry

GRIDLINE HAS TEAMED UP with The Belfry again to offer the winner of this month's photo competition a fabulous two-night hotel stay for two people.

Set in 550 acres of beautiful West Midlands countryside, The Belfry golf resort has 324 well-equipped bedrooms, as well as a leisure centre, and has hosted the prestigious Ryder Cup between Europe and the USA on four occasions.

The theme for this issue's competition is 'winter wonders'. Send in your selected photo to Gridline Photo Competition, 23-25 Waterloo Place, Warwick Street, Leamington Spa, Warwickshire CV32 5LA, or email it to gridline@uk.ngrid.com. The closing date is 08 February 2012. Only National Grid grantors are eligible to enter.



INCLUDED IN THE PRIZE

- Two nights' accommodation in a suite for two.
- Dinner for two in The Atrium restaurant on both nights.
- Full English breakfast in The Atrium both mornings.
- Use of the Health and Wellness facilities.

Please note, use of the golf facilities is not included and will incur a charge.

Terms and conditions:

The prize must be taken by 30 August 2012, subject to availability, and must be taken as detailed, there is no cash alternative. Accommodation is based on two adults sharing a suite. The Belfry reserves the right to withdraw the competition at any time and/or change the prize due to unforeseen circumstances. Standard Belfry terms and conditions apply.