

THE LATEST NEWS FROM SCOTTISHPOWER RENEWABLES

THE EAST ANGLE

EAST ANGLIA OFFSHORE WINDFARM PROJECTS | WINTER 2017/18

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Investment



Jobs



Skills

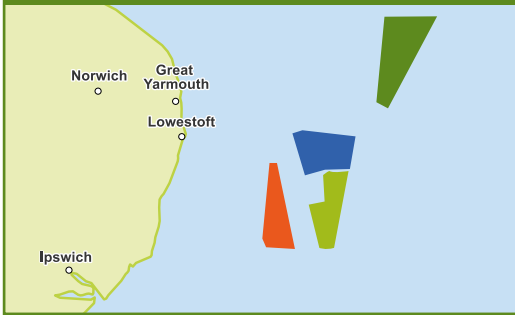


Environment



SCOTTISHPOWER
RENEWABLES

East Anglia Projects at a Glance



East Anglia ONE

102 turbines
714MW

Powering almost
600,000 homes¹

3,000 construction jobs
and long-term jobs

£2.5bn investment with
50% UK content



East Anglia THREE

172 turbines
1,200MW

Powering nearly
one million homes²



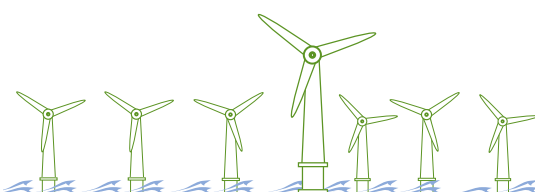
East Anglia TWO

900MW



East Anglia ONE North

800MW



Welcome

Welcome to the latest edition of our East Anglia newsletter. Since the last edition, we have commenced onshore construction works for our East Anglia ONE offshore windfarm and received planning consent for our East Anglia THREE offshore windfarm.

Looking to the wider offshore wind industry, the Government's latest Contracts for Difference³ auction saw huge cost reductions, demonstrating that offshore wind is in pole position to be the foremost low carbon power source, with the UK as the global market leader.

In a little over a decade, our sector has delivered substantial amounts of green electricity for the UK, supported billions of pounds of UK investment and created thousands of high quality jobs. No other sector ticks all of the boxes in its ability to support the Government's plans for rebalancing the economy and promoting economic diversity through the Industrial Strategy.



We have already awarded a number of major contracts for East Anglia ONE and, with the support of a highly-skilled supply chain, our East Anglia projects will further enhance the UK's position as a world-leader in offshore wind, with East Anglia right at the heart of it.

You can find out more about our work in the region on the coming pages and if you would like further information please visit spreastanglia.co.uk

Best wishes

C. Jordan

Charlie Jordan
Project Director, East Anglia ONE

East Anglia ONE Update



Construction underway at Bramford

Since the Spring of 2017, we have seen great progress on our East Anglia ONE project. With onshore construction works having commenced, East Anglia ONE is currently the most cost effective offshore windfarm to go into construction in the UK.

Onshore pre-construction works, such as highways improvements, have been successfully carried out. We have also set up construction compounds at agreed locations along the 37km buried cable route.

Construction activities have commenced on the substation site at Bramford, where the clean energy generated by the offshore windfarm will flow through buried cables into our new substation and to the National Grid.

Initial works have started to build the temporary haul road, which will stretch the length of the cable route and enable construction traffic to reach the works area from designated access points.

Another important part of the work we have been carrying out is the archaeological investigations, which have seen up to 400 archaeologists working along the route to ensure any items of historical significance are recorded, removed and archived.

We have held a number of public information events over the last few months to share details of the works and answer any questions. Three archaeology open days have also been held by Wardell Armstrong in villages along the cable route.

East Anglia THREE Receives Planning Consent

On 7th August 2017, we received planning consent for our East Anglia THREE offshore windfarm.

This will be our second consented offshore windfarm off the coast of East Anglia and will have a capacity of up to 1,200 megawatts using larger, more efficient 'next generation' turbines.

Located 69km off the coast of Norfolk with an area of up to 305 square kilometres, the windfarm could produce enough electricity to power the annual demands of nearly one million homes².

As part of the development process we contracted a range of consultancy services in order to complete environmental assessments and other works required to satisfy the stringent requirements of the UK planning system. This required over 60 staff to complete activities such as technical impact assessments, drafting of an environmental statement and other related reports, supporting consultation with regulators and stakeholders, and helping refine project design along the way.

Following consent, offshore survey works began to further examine the seabed along the offshore cable route and windfarm site. Geophysical, geotechnical and unexploded ordnance surveys are taking place to explore the make-up of the seabed and identify any unexploded objects.

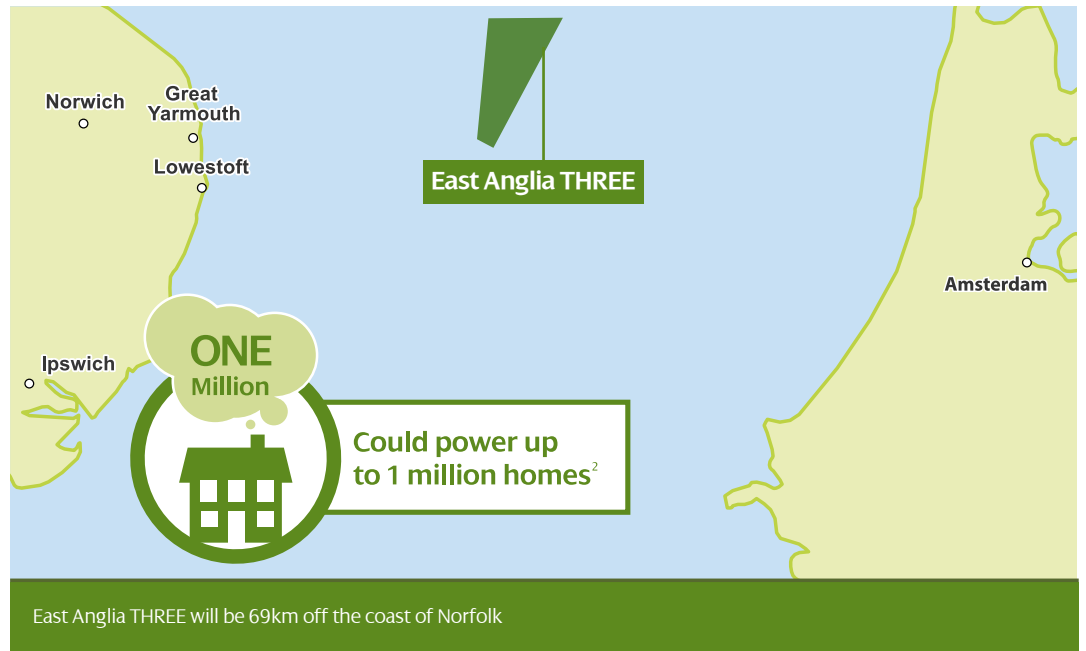
We are now preparing the project for the next phase. The regulatory framework in the UK requires that offshore windfarm developers enter pre-qualified projects into a Contracts for Difference (CfD)³ auction process, where the most economic projects are selected to receive a contract. If successful in future CfD auctions, we would like to commence construction around 2022, with the project operational by 2025.

1) Based on the following calculation: 714 MW (installed capacity) x 0.367 'offshore wind' average load factor (Digest of UK Energy Statistics) x 8,760 hours (hours per year) / 3,900kWh (average domestic annual consumption) = 588,578 homes powered equivalent

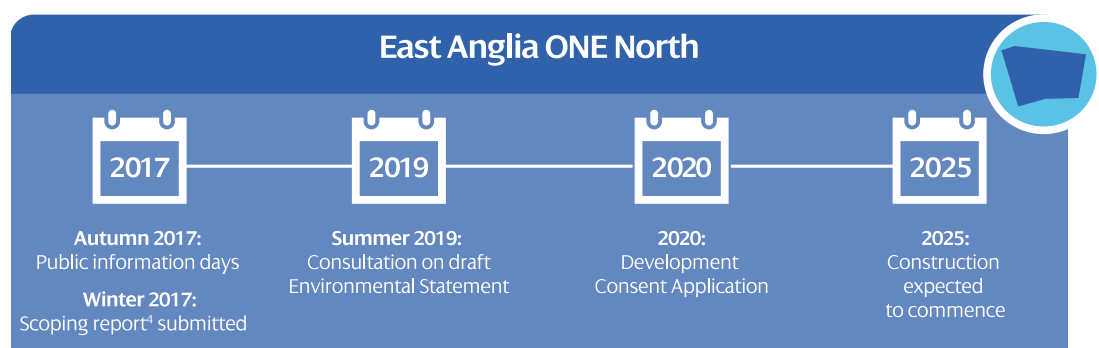
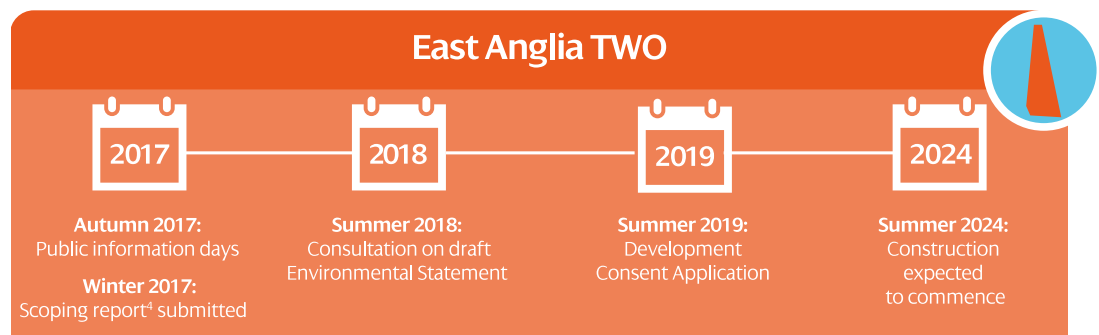
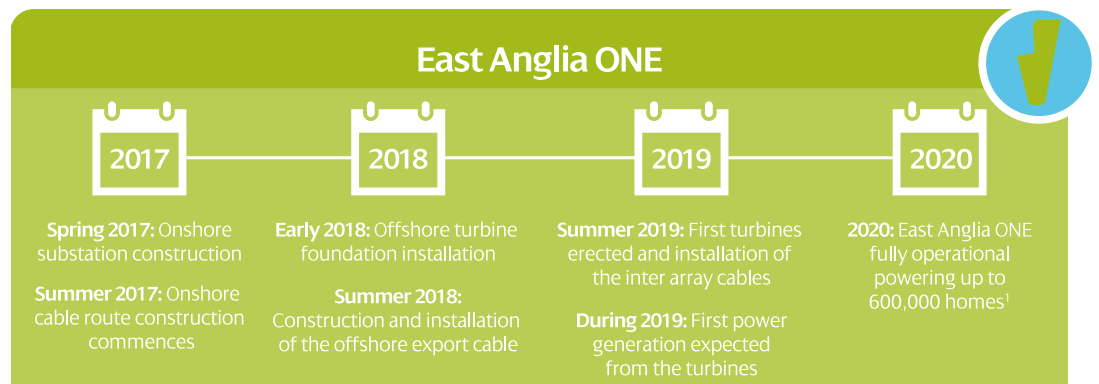
2) Based on the following calculation: 1200 MW (installed capacity) x 0.367 'offshore wind' average load factor (Digest of UK Energy Statistics) x 8,760 hours (hours per year) / 3,900kWh (average domestic annual consumption) = 989,200 homes powered equivalent

3) www.gov.uk/government/publications/contracts-for-difference/contract-for-difference

4) Providing a description of project components and the connection route to the electricity transmission network.



Project Timelines



Investing in the UK and Creating Local Employment



ScottishPower Renewables is committed to maximising the investment and economic opportunities for communities close to its projects.

We are leading the way with our target of spending 50% of the £2.5bn East Anglia ONE project investment in the UK.

East Anglia ONE will sustain up to 3,000 jobs during construction of the project and up to 100 skilled long-term jobs for the 30-year expected lifespan of the windfarm.

The Port of Lowestoft will be the operations and maintenance hub for 30 years, an agreement worth £25m. We have also co-invested £5m in preparing Great Yarmouth Port for offshore windfarm construction activity, securing its long-term potential.

We have provided input to the Supply Chain innovation for Offshore Renewable Energy (SCORE) funding programme to support small and medium businesses across East Anglia developing new working practices or technologies for the industry.

East Anglia ONE will sustain up to 3,000 jobs during construction of the project and up to 100 skilled long-term jobs for the 30-year expected lifespan of the windfarm.

East Anglia ONE is the first of the four windfarms we are planning off the coast of East Anglia and we are committed to long-term investment and creating lasting opportunities in the region.



East Anglia Contracts

Delivering investment to East Anglia is a major commitment for ScottishPower Renewables. We have hosted several strategic events in partnership with the East of England Energy Group (EEEGR).

One such example is the recent supply chain event, held at the Norfolk Showground, which saw a number of our East Anglia ONE contractors present to the audience about the scope of works to be carried out. Each contractor also detailed the services they would be looking to utilise to carry out the works and explained how businesses could get involved in the project. Hundreds of people from businesses across the region and further afield attended the event to hear about the opportunities on the project and network with key individuals.

We have already placed a number of important contracts for different elements of the construction work for our East Anglia ONE windfarm.

These significant contracts placed with our Tier 1 and Tier 2 suppliers have also led to a raft of subcontracts being placed with companies in East Anglia and across the UK. One example is the contract we have awarded to Roadbridge for site enabling, access and welfare along the cable route, which, at the time of writing, has resulted in a further 53 subcontracts being awarded.

We strongly encourage all of our suppliers to place subcontracts within the UK and particularly with companies based in East Anglia, where possible. Roadbridge has awarded subcontracts to a number of East Anglian companies such as Agri Hire, Tippers R Us, Toppesfield, Collins Waste and many more.

An example of some of the East Anglia-based companies we are working with on the construction of our East Anglia ONE windfarm can be seen below.



Charlie Jordan, East Anglia ONE Project Director, speaking at the Supply Chain event



Tier 1 and Tier 2 suppliers hold a Q&A session



Palmer Group

Ipswich-based Palmer Group is undertaking traffic management along the onshore cable route. The family company supported the implementation of highways improvements and continues to assist with traffic measures such as temporary lights and signage about any works affecting a public road.

Brett

Martlesham-based Brett is providing aggregates for the substation site. Aggregate, which consists of small pieces of stone and gravel, is being used to make concrete to construct 'man holes' at the substation to enable the surface water to drain away from the site.



Brown & May Marine Ltd

Brown & May Marine, based in Eye, has been working on East Anglia ONE for a number of years conducting ecological studies, surveys and analysis, as well as ongoing liaison with the fishing community. Through this partnership the Commercial Fisheries Working Group was established.

Mann Farms Ltd

Mr Mann is one of the landowners along the cable route and his farming business has been contracted to assist with removing vegetation within the cable route construction sites. This includes ground maintenance such as removing weeds, cutting grass and clearing crops.



Work Skills for Varsha



Varsha Gunness

After completing a degree in Energy Engineering with Environmental Management at the University of East Anglia, Varsha Gunness joined us for a six-week work placement this summer, enabled by East Coast Energy Internships and supported by The Ogden Trust.

Commenting on her time with us, Varsha said: "During my placement with the East Anglia ONE team I've gained real industry experience and awareness of the huge range of career paths in renewables.

"I'm so glad that I applied; I've learnt about all aspects of building an offshore windfarm and discovered the project management side really appeals to me, so I'm now considering a masters in Environmental Management to specialise and build up my knowledge in the area.

"My confidence has grown so much in the last six weeks. I know this placement will be invaluable for my future in the energy sector."

Suffolk Show

We teamed up with Mad Science to impress the crowds at The Suffolk Show. Members of the project team were on hand to talk to show-goers about the windfarm and answer any questions. Those who wanted to know what a windfarm is really like tried out our virtual reality headsets, allowing them to experience climbing up inside a turbine and looking out at the view from the top.



Mad Science inspiring young minds at the Suffolk Show



'Helium Helen' delivers STEM workshop at Bramford Primary School

Mad Science School Workshops

We are committed to inspiring future generations of engineers and scientists to work in the offshore wind industry, through the implementation of our East Anglia ONE Skills Strategy.

Nearly 1,000 young minds across Norfolk and Suffolk were inspired by the wonder of wind power in a series of hands-on workshops delivered by Mad Science on our behalf. The sessions were held at twelve primary and secondary schools across East Anglia, providing assemblies and workshops packed with 'windy' science experiments.

Matthew Green, teacher at Bucklesham Primary School, near Martlesham, Suffolk, said: "The children were really engaged by Mad Science's assembly and workshops; that sort of hands-on learning is invaluable. The activities were great fun for the pupils, with experiments and predictions. This type of activity really inspires them to investigate a world full of science."

Careers Talks and Lowestoft Skills Conference



Ana Rodriguez, Electrical Engineer, giving a careers talk

An Electrical Engineer and Environment Manager from ScottishPower Renewables gave careers talks at East Norfolk Sixth Form College, Lowestoft College and Thorpe St Andrew School to give an insight into their jobs, our variety of windfarm projects and the range of opportunities available locally in the offshore wind industry.

We also held two workshops at the Lowestoft Skills Conference at East Point Academy, with our East Anglia ONE turbine provider, Siemens. Students aged 13-16 had the opportunity to meet a wind turbine engineer and ask questions about their exciting workplace.

New UEA Scholarships Awarded



The 2016/17 ScottishPower Foundation scholars receive certificates from the King and Queen of Spain and Iberdrola Chairman Ignacio Galán at Iberdrola's global ceremony in Madrid

Since 2016, ScottishPower Renewables has donated £100k each year to the ScottishPower Foundation to fund Masters scholarships in the UK for students wishing to continue their studies in energy engineering and environmental sciences. Through this donation to the Foundation, four postgraduate students were successfully supported through their Masters courses at the University of East Anglia in 2016/17.

This academic year, 2017/18, we are once again supporting four students to achieve their Masters qualification.

Following a rigorous interview process, four outstanding students have been selected to receive a ScottishPower Foundation scholarship to study at the University of East Anglia this academic year. The ambitious scholars: Stefan Bartlett, studying Energy Engineering, and Stella Foster, Harry Bransby and Holly Diggins, studying Environmental Sciences, receive funding to cover the full enrolment costs as well as a living allowance.

Through the scholarship the students will also have additional opportunities including meeting leading industry professionals at events like Offshore Wind Week at OrbisEnergy in Lowestoft, and special excursions such as a behind-the-scenes visit to ScottishPower's Cruachan Hydro Power Station in Scotland.

Supporting young people through education and training to equip them with the skills required to lead the energy industry into the future is not only a key part of our East Anglia ONE Skills Strategy but is one of ScottishPower Renewables' core business objectives.

Please visit www.scottishpower.jobs for more information.



The four 2016/17 UEA scholars visit ScottishPower's Cruachan Hydro Power Station, Scotland



Virginia Ruiz Albacete

Women in Engineering

As members of the Women in Engineering Society, we actively encourage young women to consider a career in the wind industry.

One of our award-winning engineers, Virginia Ruiz Albacete, gave an inspirational talk to 200 young people at a Women in Engineering celebration event at Wherstead Park, Ipswich, Suffolk, organised by Connect Education and Business.

Virginia said: "With women making up just 10% of the engineering sector, inspiring and supporting them through career decisions is a very important part of our commitment to East Anglia. We want to help bring the sector to life for young people and broaden their minds to what's out there for them."



Young women discuss opportunities in engineering with Virginia

Onshore Survey Works

Prior to construction, we conducted extensive environmental surveys and ecological mitigation to ensure we minimise the impact to the local wildlife and environment.

We have an Ecological Clerk of Works who is based on site and works closely with our environmental team, monitoring the works and providing advice to protect wildlife, identify new ecological risks and plan correct mitigation.

Regular bird surveys have been conducted to monitor specific behaviours and, as a result, the successful fledging of chicks has been confirmed. Where breeding territories are identified, buffer zones are implemented for the breeding season.

To ensure clear communication between all parties working on the project, we have developed a live environmental constraints matrix which details any ecological environmental issues within our construction zone. It has been carefully designed to clearly communicate constraints and mitigation measures, ensuring the workforce, from contractors working on site to the wider project team, understand the risks, requirements and consequences.

Offshore Survey Works

Great Yarmouth-based marine survey company, Gardline, has been undertaking benthic and unexploded ordnance (UXO) surveys along the offshore windfarm area for East Anglia ONE.

UXO surveys include the use of non-intrusive methods (sidescan sonar, magnetometer and 3D seismic) in order to identify any potential UXO that need to be further investigated.

Benthic surveys detect areas of potential reef, subsequently investigated using drop-down video or grab sampling techniques (benthic ground-truthing). The remotely operated vehicle attached to the benthic ground-truthing vessel also looks for items of potential archaeological interest, like shipwrecks.

Results from these surveys are then analysed in conjunction with the planned cable route to judge whether any adjustments are required.

Gardline's contract with ScottishPower Renewables, worth over £6m, also includes offshore surveys for both East Anglia ONE North and East Anglia TWO.

Archaeological Works



The top soil has been stripped to allow archaeological works to take place

As part of the pre-construction works for the onshore cable route for East Anglia ONE, a large archaeological project is being carried out to identify sites of archaeological interest and mitigate the impact of the cable route on the historic environment.

We have appointed Wardell Armstrong to carry out and manage all of the archaeology works along the route.

Based on the results of geophysical survey and trial trenching undertaken in previous years, a substantial number of sites have been identified with significant archaeological potential. As part of the required works, Wardell Armstrong's archaeologists worked in conjunction with the Ipswich and District Metal Detector Club to complete a metal detecting survey of sites along the cable route. This took about two months.

The local detectorists recovered a range of items from prehistory, Roman, Anglo-Saxon and Medieval periods, from the ploughsoil.

Dave Cummings, chairman of Ipswich and District Metal Detector club, said: "The collaboration with archaeologists at Wardell Armstrong has given us a unique opportunity to investigate little studied parts of the region and discover more about our local history. Everyone who took part has learnt a great deal and firm friendships have been forged."

Leading the survey was Megan Stoakley, Finds and Archives Manager at Wardell Armstrong. She said: "I was really impressed with the metal detectorists' knowledge, enthusiasm and dedication. The close co-operation between archaeologists and the local metal detecting community has been exceptional; their contribution to the



The Mayor of Woodbridge, Clare Perkins, visits a site to see the works



Archaeological teams have excavated a range of features

project has been invaluable. It has been a real privilege to work with local people to help them to discover their heritage.”

Following the completion of the metal detecting survey, the archaeological excavation fieldwork commenced. Up to 400 archaeologists have been involved in the work over 60 hectares since February, with as many as 250 on-site at any given time.

The close co-operation between archaeologists and the local metal detecting community has been exceptional; their contribution to the project has been invaluable.

The project will reveal a great deal about life in this part of Suffolk through the millennia, enhancing our understanding of past settlement and land use activities in the region. At present, evidence from

the Bronze Age, Iron Age, Roman, Anglo-Saxon and into the Medieval period has been found.

Additionally, two students who recently completed Archaeology degrees, after studying the subject at One Sixth Form College, have been employed as site assistants excavating on the project. James Sinclair (pictured in the trench above) and Cameron Bate have played a pivotal part in these excavations.

We have been working closely with Suffolk County Council Archaeology Service and Historic England to ensure appropriate safeguards for the historic environment are in place. These works will be completed by the end of 2017 ahead of the onshore cable installation works. Once all of the findings have been recorded, removed, analysed and archived, we will share information on what was found.



Image above: Archaeological surveying

Image below: Local detectorists have recovered a range of items from Roman, Anglo-Saxon and Medieval periods





New 7MW Siemens turbines

Investment in Innovation to Drive Down the Cost of Offshore Wind

The cost of offshore wind is reducing rapidly, with costs falling 50% in the last two years. Innovation is a key element in driving down the cost of offshore wind so we are continually seeking out new technologies.

We have tested a range of technologies to combat seabed erosion, including 'frond mats', a pioneering concept using synthetic sea grass. Designed by Great Yarmouth-based SSCS, the technology acts in a similar way to sea grass, slowing the flow of water at the base of underwater structures, to protect it against scour erosion.

We're using Siemens' state-of-the-art 7MW turbines which have 75 metre glass fibre blades, use direct drive technology, provide cost savings and have increased capability.

We designed innovative three-legged jacket foundations which have advantages from manufacturing, transportation and installation perspectives.

Special 66kV cables will allow more turbines to be connected on the same circuit, reduce the cable length required and decrease losses.

We have also worked in partnership with The Carbon Trust to carry out sea trials of an innovative method of monitoring weather at sea.



A scale model of East Anglia ONE jackets undergoing tests at HR Wallingford



Construction has begun on the substation at Bramford

East Anglia ONE makes East Anglia a Construction Hotspot

In a report issued by industry analyst Barbour ABI and Construction Products Association, East Anglia ONE has been credited for boosting the region into the leading position for construction contracts in 2016.

The report compared regional construction contract values in 2016 against the average of the last four years, resulting in 'hotspots'

and 'coldspots' for last year's commissioned projects in the residential, commercial and infrastructure sectors.

Norwich and East Norfolk led all districts across the UK with more than £2.7bn worth of construction contracts, with the largest of these contracts credited to be from our East Anglia ONE offshore windfarm.

Public Information Days

Since our last East Anglia newsletter we have held several public information events for local residents, at various places along the cable route, to share details about the work we are undertaking locally for our East Anglia ONE project.

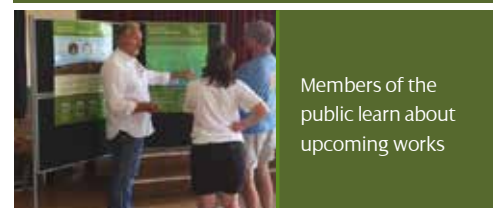
Each event is organised and attended by our stakeholder team, as well as other members of the project team such as construction, logistics and archaeology.

At the drop-in events plans for upcoming works are shared and team members are on hand to answer any questions and provide further details.

As the works continue, additional public information days will be held to share information with the communities surrounding the works. Please check spreastanglia.com for details.



Photos of interest on display



Members of the public learn about upcoming works

Construction Works Underway

Works have commenced for the new East Anglia ONE substation, which is being built adjacent to the existing National Grid substation. This is where electricity from the windfarm connects to the grid.

At Bramford the substation site is being stripped and levelled, with special drainage systems installed, including ponds which will form an area of wet woodland. Once these initial works are complete the main civil contractor will construct the substation.

Construction works for the cable route, which runs from landfall at Bawdsey to the substation in Bramford, have also started. The 37km cable route has now been fenced off to restrict access to the site whilst works are taking place. Initial activity along the route includes building site compounds, stripping topsoil and laying a temporary access road.

The archaeological works are scheduled to be complete by the end of 2017, following which we will commence works at the Bawdsey landfall site in early 2018. This will be followed by the supply, delivery and installation of cable ducts and cables, via the excavation of trenches and Horizontal Directional Drilling (HDD).

The majority of the access roads and highway improvements have been completed.

The ducts which house the underground cables will be installed by open cut trenching and, at 20 sites along the route (for example where the route crosses a major road or river), by the pioneering technique of Horizontal Directional Drilling. The cables will then be delivered to the sites on large reels and installed.

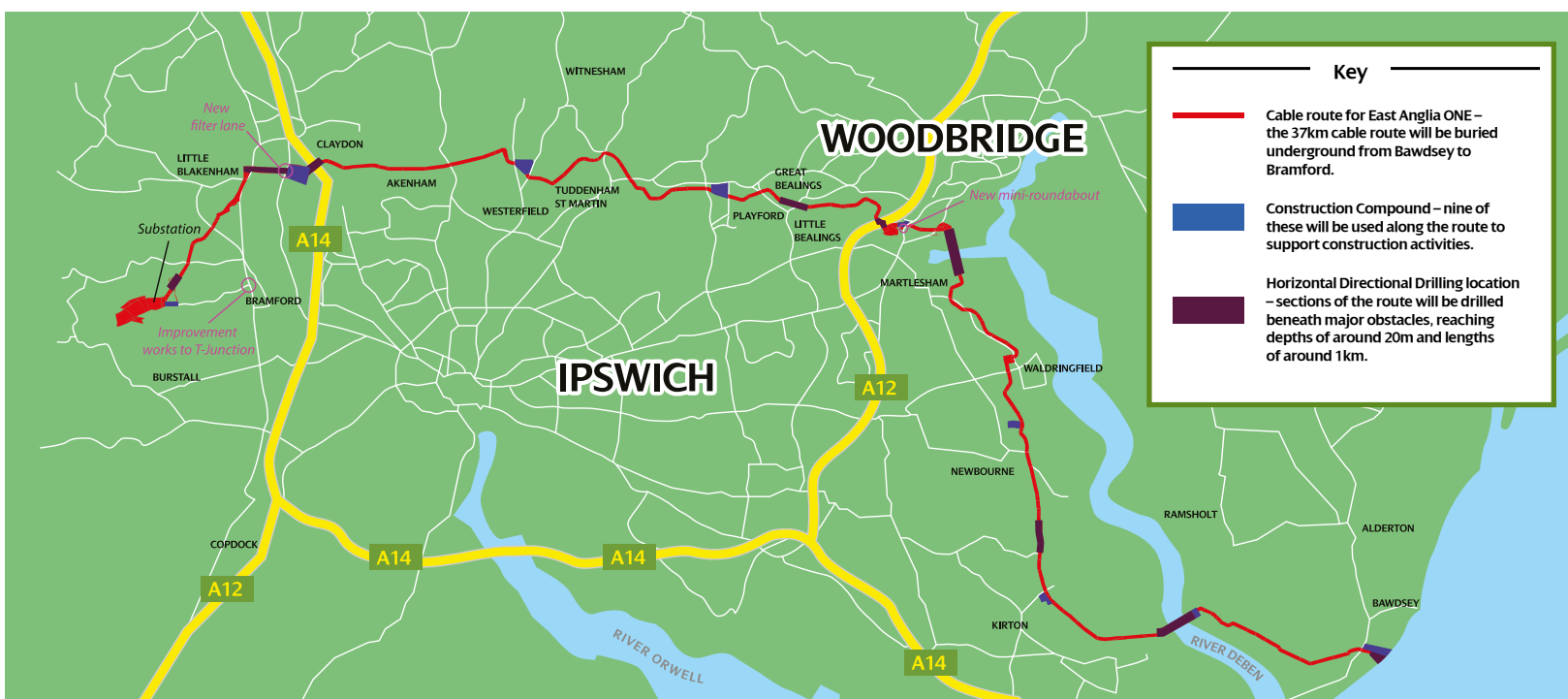
There are only 19 permitted access points along the 37km cable corridor and therefore

a temporary stone haul road will also be installed along the length of the route, within the construction fence boundary, to allow construction traffic to access the works area.

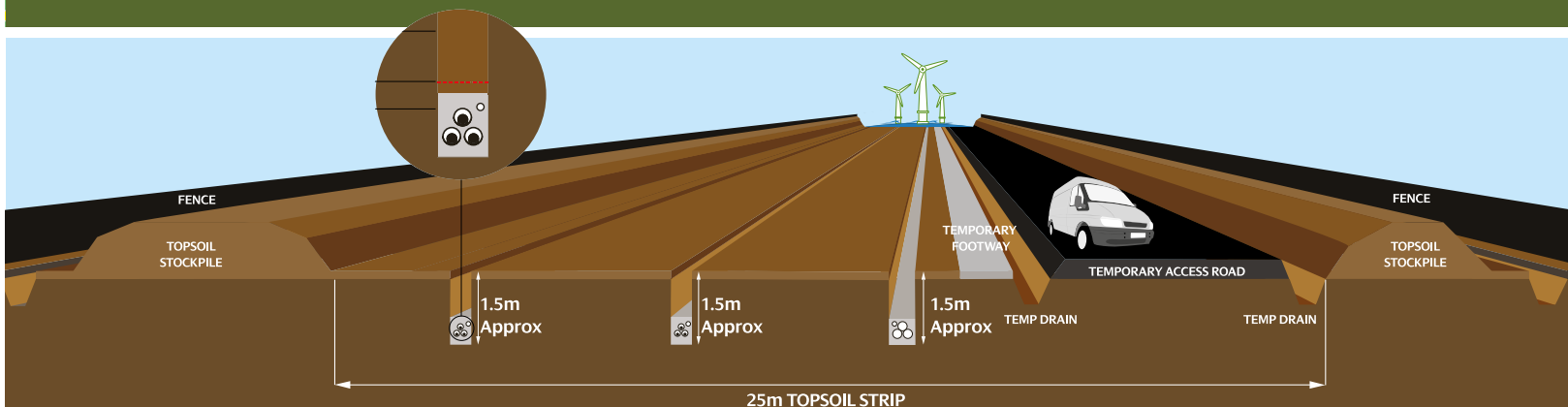
A Traffic Management Plan and Code of Construction Practice have been agreed with Suffolk County Council and are strictly adhered to.



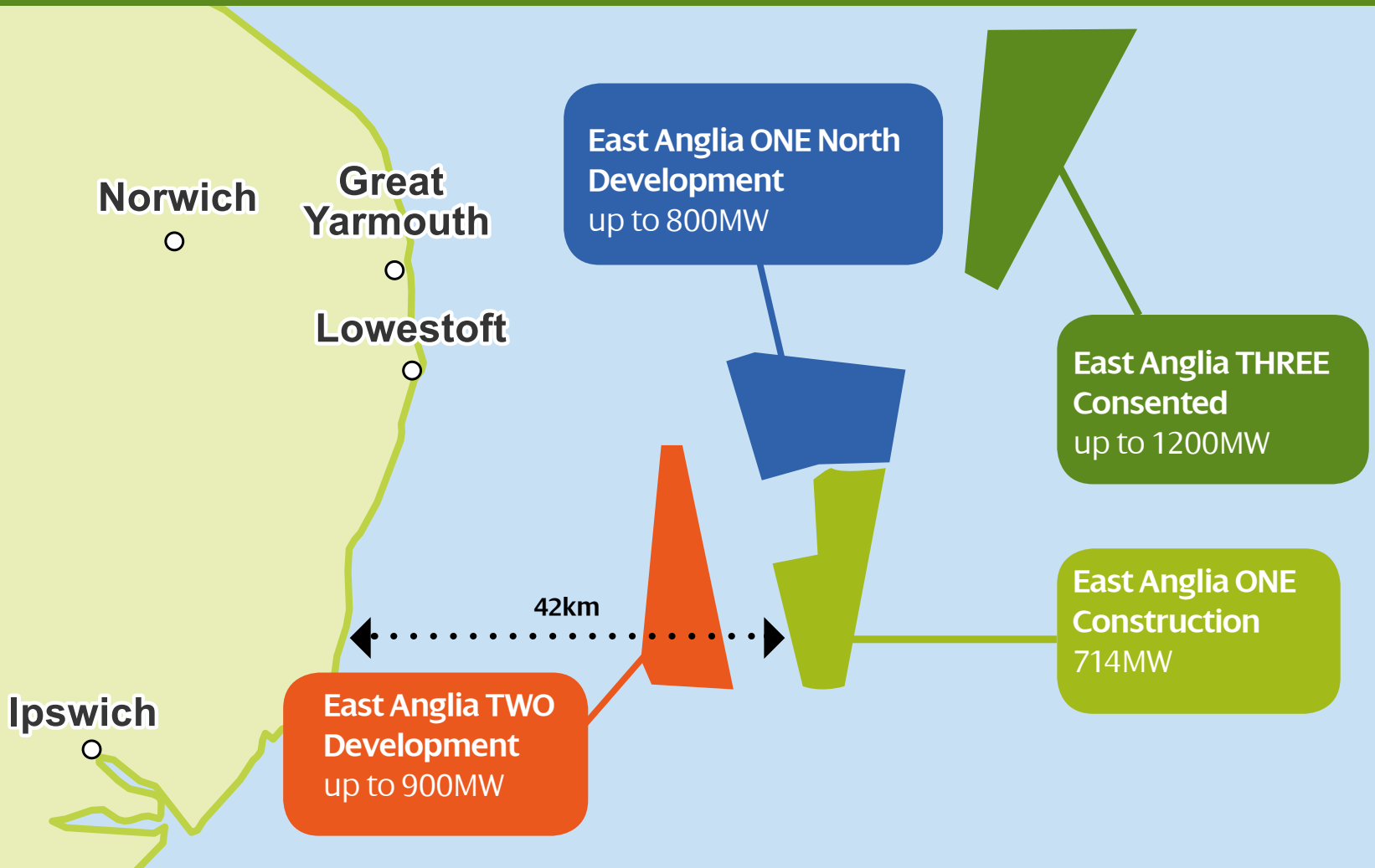
New haul road entrance at Sandy Lane, Woodbridge



The East Anglia ONE cable route runs from Bawdsey to Bramford



Cutaway of the onshore cable route (not to scale)



Our East Anglian windfarms

East Anglia TWO and East Anglia ONE North are the third and fourth offshore windfarms we are planning to develop off the coast of East Anglia and we hope to commence construction for the windfarms around 2024/2025.

While East Anglia ONE and East Anglia THREE are proposed to connect to the existing National Grid substation at Bramford, we are exploring an alternative coastal connection point with National Grid for East Anglia ONE North and East Anglia TWO.

It is anticipated these projects will connect to the grid in the vicinity of Sizewell and Leiston. The exact position of connection is yet to be determined, but we are mindful that a coastal location minimises the infrastructure needed and, as such, the onshore impacts.

The potential cable route areas and methods of connection are being refined and consultation is underway with local agencies regarding possible constraints.

It is likely that each project would require an onshore substation, to which power from the offshore windfarm would flow via

underground cables. An underground circuit would then provide connection to the existing National Grid infrastructure with details of final works to be determined.

A connection near Sizewell should not require any new overhead transmission lines and would not affect proposed nuclear power station Sizewell C's planned export capacity.

In order to further minimise onshore construction impacts, similar to our East Anglia ONE and East Anglia THREE projects, we are proposing to install ducting for East Anglia ONE North during construction of East Anglia TWO where the routeing is the same.

What happens next?

We will work with National Grid and others to further develop our plans.

In November 2017 the projects will move into the Environmental Impact Assessment scoping phase. During this process we seek to quantify the scope of the environmental assessment with The Planning Inspectorate and other consultees.

In 2018 we will finalise our proposals for East Anglia TWO. Building on our 2017 engagement, we will communicate in detail what is proposed and what the anticipated environmental impacts are through the publication and consultation of a draft Environmental Statement. East Anglia ONE North will follow.

Public Information Days and briefings will be held throughout the process.

Contact us

If you have a query regarding East Anglia ONE, please contact Ed Rees or Nikki Berry. For queries relating to the other East Anglia projects, please contact Joanna Young at jyoung@scottishpower.com

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