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SPRING 2016

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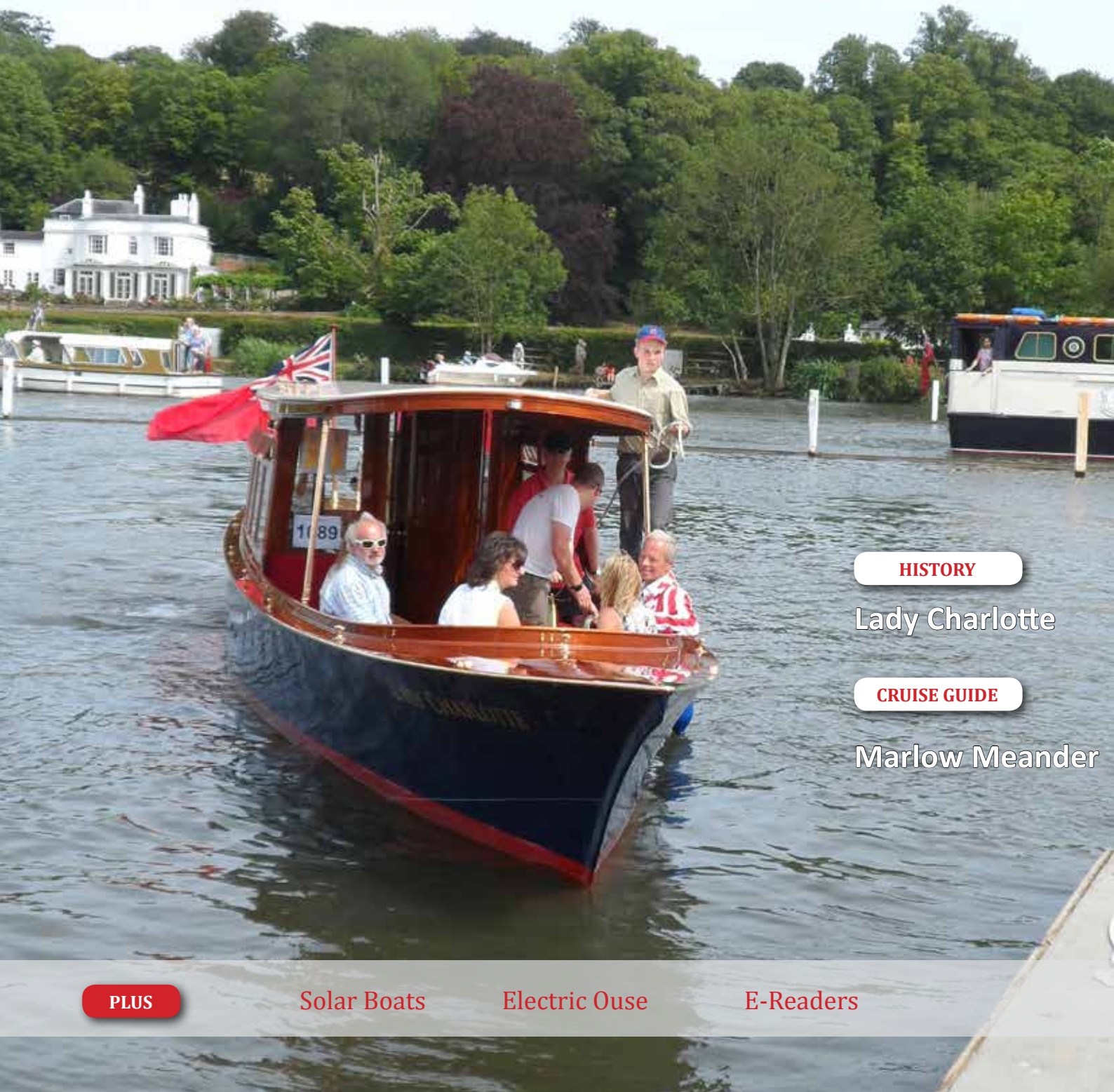

HISTORY

Lady Charlotte

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Marlow Meander

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Electric Boat

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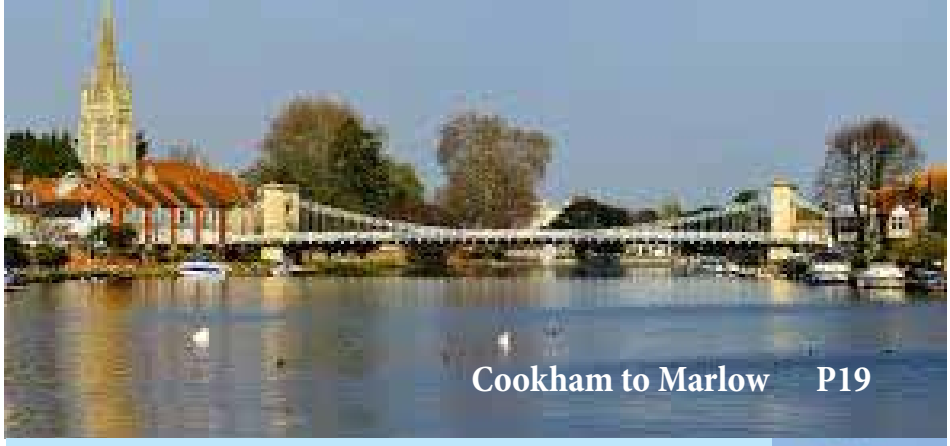
Contributions from members and readers are welcome although we cannot be held responsible for any damage or loss which may occur to material provided. Items of interest include letters, reports of rallies, events, cruises, articles and advice on building and running electric boats and on items of equipment. We also welcome manufacturers' reports on new equipment and boats.

Copy Deadlines

Material to be considered for inclusion in Electric Boat should be sent to the editor (preferably by email) by the following dates:

Spring	31 January
Summer	31 May
Winter	30 September



Cookham to Marlow P19

e-reading

When technological change comes it is often, when viewed from an historical perspective, at the speed of a dam bursting. The railway boom of the nineteenth century had virtually covered the country in railway track within twenty five years, totally revolutionising the transport system. Today autonomous electric cars seem to be on a similar trajectory.

This is the first digital edition of Electric Boat and if you are reading it on a tablet, such as the entry level Kindle Fire featured on page 31, it may well be that the idea of paper periodical magazines is soon seen as belonging to a past age.

This Spring 2016 edition will be downloadable as a pdf to be stored in the tablet or computer memory and available to read at any time.

Past editions will be similarly accesssible to download and store as a digital archive.

In concept this is different from an on-line magazine such as the Dutch ElektrischVaren (see page 8) which is only readable when connected to the internet.

Anton Shiere the editor of ElektrischVaren has covered all this year's 2016 North European boat shows which always have a very strong electric boating exhibitor attendance and he has kindly allowed Electric Boat to use his pictures and features to give an insight into what is happening in the European electric boat market.

The Dutch Solar Boat World Cup sponsored by the giant Dong Electricity is now in its tenth year and going from strength to strength. Of particular interest is the Young Solar 2016 Challenge (see page 15) and the futuristic machines that are being designed by Seeker Vripack, renowned Dutch Naval architects, to be a competition boat racing class. Schools and colleges can buy the design plans at a sponsored cost to build their own boat and enter in the competition.

As part of securing the EBA's future the Association website is being revamped and there will a members only area for accessing the magazine and other membership benefits.

But while this part of the Association is embracing the digital revolution and entering cyberspace the EBA will also be on terra firma at this year's Crick Boat Show, which is the UK's largest inland waterways show, and our attendance will be covered in full in the next issue of Electric Boat.

Don Wright

Cover: Lady Charlotte at the Thames Trad

Electric Boat

Volume 29
Number 1
Spring 2016

Published three times a year by the Electric Boat Association

Website: www.electric-boats.org.uk

ISSN 2059-4313

Broads Authority We are grateful to the Broads Authority for their support for the Electric Boat Association

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Spring 2016

In Brief

Help for Heroes

Leading charities Canal & River Trust and Help for Heroes have received a £500,000 award from the People's Postcode Lottery's 'Dream Fund' for their 'Heritage Heroes' project, an ambitious plan to change the lives of ex-servicemen and women through a programme of canal restoration. Around 200,000 local people will be involved through events, walks, education programmes and other activities. Clara Govier, head of charities at People's Postcode Lottery, said: "The 'Dream Fund' gives organisations the opportunity to work on projects that they could only dream. Richard Parry, chief executive at Canal & River Trust, said: 'The project will teach the ex-servicemen skills in land-based management and construction. Inspiring and working with volunteers they will be rebuilding locks, restoring canal-side hedgerows, making repairs to canal heritage and getting thousands of local people to connect with their local waterway.'

London Mooring

The Canal & River Trust is setting out its plans to develop a London Mooring Strategy to address the unique challenges and opportunities of boating in the Capital. Boating in London has become more challenging as boat numbers on London's waterways continue to grow putting pressure on mooring facilities and infrastructure. Over the past few years the Trust has been working with boaters and other stakeholders on solving the problem. While a number of trials have been carried out and there have been some positive changes, for example the creation of new long-term moorings and bookable moorings, it is clear that a plan of action that covers all aspects of London moorings, developed with waterway users, is necessary.
The development of the London Mooring Strategy is anticipated to be completed in 2017.

Bridgewater Canal Worsley
Christine Smith

James Brindley 1716-1772

2016 is 300th anniversary of the birth of the canal builder and engineer, James Brindley, often referred to as the "father of English canals". The UK inland waterways network has its origins in his work and vision to link the River Trent to the River Mersey led to the building of 365 miles of canal at the heart of the network. He was born in Derbyshire in 1716 and was apprenticed as a millwright in the village of Sutton near Macclesfield, Cheshire. By 1742 he had returned to his family's home town of Leek, Staffordshire where he set up in business as a wheelwright. As his reputation for good workmanship spread he was invited to resolve a flooding problem at a coal mine at Clifton, near Manchester, where he created a hydraulic power scheme to pump the mines. His scheme was in continuous use from 1756 to 1924. Meanwhile the Duke of Bridgewater was looking for a way to resolve the costs of dealing with flooding in his coal mine at Worsley and the price of his coal being undercut following the opening of the Sankey Canal in 1757. The Sankey Canal, also known as the St Helen's Canal, was the first canal in Britain since Roman times. The Duke's agent, John Gilbert, came up with the idea of excavating a new channel to drain the Worsley mine, which would be constructed on a large enough scale to allow the use of barges for transporting the coal from the mine as well as resolving both flooding and water supply issues. Brindley's contribution to the scheme included the Barton Aqueduct, which carried the canal over the River Irwell, the first such structure in England. The Worsley to Manchester section of the Bridgewater Canal was completed by July 1761. The success of the Bridgewater Canal meant that Brindley's earlier survey for a canal to link the Trent and Mersey rivers was resurrected, with the Duke of Bridgewater backing the scheme. Also supporting the building of this canal was pottery owner Josiah Wedgwood. The canal would enable his pottery to be transported with considerably less breakages than with packhorses or wagons, as well as being much faster..

Super Slipper

EBA member Henley Sales & Charter have delivered *Carioca* the first of two conversions of a slipper launch by their ex superyacht electronics engineer Steve Hoile.

Electric cargo ship

Solar Sal, a 40ft solar-electric vessel powered by a Torqeedo electric propulsion system, has completed the final leg of its maiden cargo run, carrying recycled cardboard along the Erie Canal in New York, USA, without using fossil fuel. *Solar Sal* traversed 72 locks and travelled a total of 650 miles across the state of New York, delivering four tons of cargo from Lockport to a paper mill in Mechanicville on its history-making journey. The vessel runs at 8.3mph on twin Torqeedo Cruise 4.0 electric motors. Providing the equivalent thrust of two 9.9hp combustion engines, these emission-free electric motors run on sunlight. Designed by David Borton, who aims to build 10 solar-electric boats a year, the vessel features a wooden, strip-built hull with maximum surface area for solar collection. It can be fitted as a 12-ton cargo ship, dayliner tourist vessel or cabin cruiser, using free, clean solar fuel. 'The best part of these motors is their efficiency,' said Borton. 'That includes the electronic control, good motor, planetary gear reduction and efficient, slow, large propeller.'
Solar Sal can motor all day in daylight and up to 50 miles after sunset on stored battery power. It's fitted with 5kW of solar panels, serving two battery banks. One powers a bank of Torqeedo's Power 26-104 lithium batteries, the other powers conventional lead-acid batteries

Electric styrofoam punt

A car toppable electric boat made its debut this year at the Miami International Boat Show. Its builder Mark Isaacs, from Bay St Louis, Mississippi, says he has carried it on the roof rack of his Toyota Prius hybrid sedan without a problem. The craft's lightweight construction has everything to do with its portability, according to Isaacs: 'It's basically one big hunk of styrofoam that's covered with a fibreglass reinforced mesh and coated in acryllic.' The eight-foot by four-foot boat weighs just 65 pounds and is powered by a Torqeedo 1003 outboard which provides the equivalent thrust of a 3-4hp gas powered engine. At one or two mph you stand a chance of going 10 or 20 miles, but I think it's the ideal boat for a three-to-six-mile round trip,' Isaacs said.

In Brief

Flood Relief

A fundraising appeal launched to help communities along Calderdale's flood-damaged waterways get back on their feet has raised more than £140,000. The money has bolstered the clean-up efforts and helped to repair almost all sections of towpath that had been damaged and in some places washed away. As a result important links between communities have been reinstated and local residents can once again enjoy getting away from it all on their nearest towpath. Many of the towpath works have been carried out by dedicated volunteers who have given over 3,500 hours to clear dumped silt, fill in holes, and resurface washed out sections of path. Volunteers aged from 8 to 80 have pitched in with people from local businesses, community groups, canal societies and even a team of junior soldiers all getting involved. Since the devastation of the Boxing Day floods over 10km of damaged towpath have been restored and sections of canal from Hebden Bridge to Salterhebble and Brighouse to Wakefield and beyond reopened to boats, with more due to follow in the coming months.

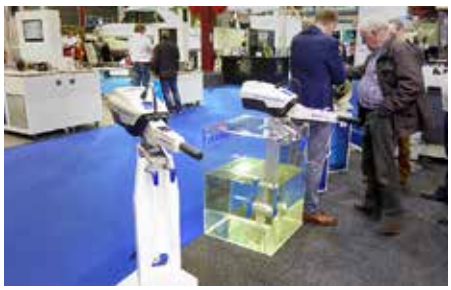
FAST Trophy

At the suggestion of Kevin Desmond the EBA was delighted to receive from the Ninth Earl of Arran the donation of a magnificent new Trophy, to be called the Fiona Arran Speed Trophy, FAST for short, to be awarded each time the World Electric Water Speed Record is increased.
His late mother, Fiona, Dowager Countess of Arran had been the EBA's Honorary Vice President and had donated a silver cup, which was named the St David's Trophy, to the Association to be awarded for services to electric boating.
Last year the St David's Trophy was awarded to our current President, John Hustwick who, previously as Chairman for many years, had kept the EBA in good order.

Boat shows

When it comes to exhibitions showcasing marine leisure electric boats and boating, the industry has much more prominence in the German and Dutch boat shows than in the equivalent shows in the UK. Anton Schiere the editor of the Dutch online magazine ElektrischVaren has attended all the main start of season shows and has kindly allowed Electric Boat to use copy and pictures from his Boat Show Special reports *www.elektrischvaren.info*

Boot Holland 2016 which took place in Leeuwarden from 12 to 17 February attracted over 37,000 visitors, about then same as last year. With a total area of 40,000 square meters, divided into five exhibition halls the Show is the traditional opener for the leisure marine season.
After being greeted by Neptune at the entrance the show aims to have something for everybody and, as well as being a fun day out, the electric boating market is well represented as can be seen from some of the main exhibitors featured on this page.



Whisper Power the Dutch manufacturer of gensets shared a stand with Warber Jachtservice and Yachtcontrol which installs electric propulsion systems based on Kräutler and Bell Marine drives. Whisper Power's gensets on display included the popular small Piccolo generator.

Solbian had all three series of their solar panels, CP, SX and SP on display. The SX series is new with unique square 19% efficient solar cells that make these panels up to 10% more efficient then comparable panels with the same Wattage. The Sun Power (SP) series with more than 22.5% cell efficiency Solbian says are the most efficient panels on the marine market.

Happy Whale got a preferential loan from the Frisan Clean Energy Fund to build electric boats for the Friesland waters boat rental market and the three different models now available were on show. As zinc anodes are not permitted all have plastic propellers.

The ePropulsion Spirit 1.0 is a 1kW electric 48 VDC Lithium-powered outboard manufactured in Hong Kong and now available through European dealerships. The 1kW battery is easy to unplug and remove and the motor and controller are housed in the underwater self cooling pod.

Victron Energy is one of the major power electronics manufacturers and the 40 year old Dutch company's inverters chargers and controllers could be seen on distributor stands and boats all over the show.

MienSkip is a spin off project from a Friesland state sponsored electric boating initiative with the objective of developing a self assembly boat with a hull design optimised for electric propulsion, which can be built in eight hours and costs just €12,500.

Boat shows

Boot Dusseldorf is by far the largest European boat show with 247,000 visitors and 1,800 exhibitors attending the 2016 event at the end of January. As can be seen from ElektrischVaren's tour of exhibitor stands, the show has lots on offer for everybody interested in electric boats.

Ruban Bleu has been building boats in Brittany since 1992 and over the last 24 years has sold over 1,300 boats. Their electric boats, which are particularly favoured by the rental market, are powered by Kräutler motor pods and with the boats Trojan battery system can cruise for seven to eight hours.

Piktronic highlighted the highly effcient Treflux RevoOpti ring motor available in 24 and 48Vdc.

Fischer Panda displayed a 3kWfuel cell system operating on propane, as well as its gensets and parallel e-drives which use an electronic disconnectable belt transmission.

Aquamot displayed their new line of 'all in one' 1.1 and 1.6 kW e-outboards that have a removeable 640W Lithium Ion battery fitted to the back of the controller housing.

Kräutler displayed their remote steering AC sail drive with integrated throttle. The sail drive gearbox gives an improved propeller efficiency.

Torqeedo had their 20 kW Sail Drive, 10 kW outboard and 2.0 and 4.0 Cruise motors pod versions on display. The last three at 24 and 48 Vdc.

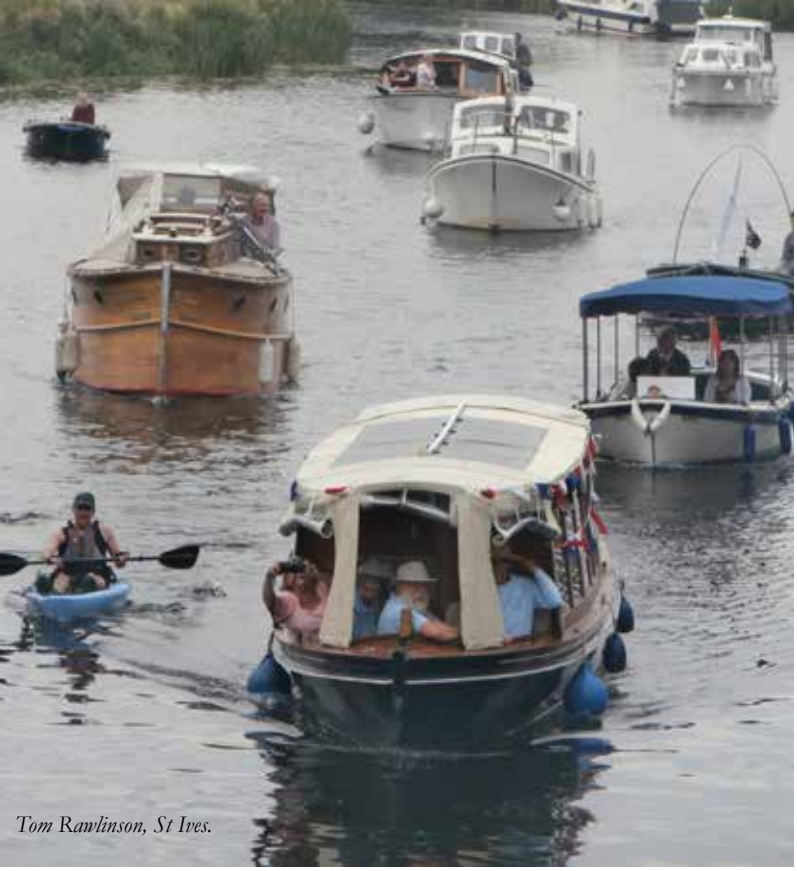
Elco have a range of powerful electric outboards, starting with the 4.8kW 48Vdc EP-9.9 which has a static thrust of 130lbs equivalent to 9.9HP

The Amsterdam Boat Show attracted over 40,000 visitors in the five days 16-20 March, and although the number of attendees remains much the same compared with previous years, the number of electric boats

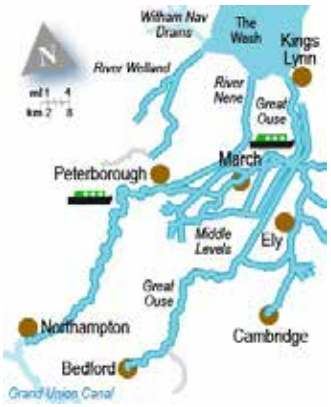
being exhibited is growing year on year and very much encouraged by the canal city. Nearly all the electric boats seemed to be powered by a Torqeedo Cruise 2.0 or 4.0. Most of the major companies exhibiting at Amsterdam:

Fischer Panda; Kräutler; Solbian; Torqeedo; Victron Energy had also been at Dusseldorf and Holland boat shows in the previous two months so there was little new to report with regard to electric boats.

Ouse Electrified



Tom Rawlinson, St Ives.



EBA Chairman Jeff Hide reports on last year's landmark Greate Ouse Challenge

Over the August Bank Holiday weekend last year EBA members Les and Elaine Fidler took on the challenge to cruise the whole length of the River Great Ouse navigation from Bedford to Denver in their electric boat *Annie III* relying solely on solar power to recharge the batteries.

They set off in brilliant sunshine from Bedford, the head of navigation, on Friday and were accompanied by Steve Gull and EBA Chairman, Jeff Hide, in *Siren*, Steve's 26 foot wooden cruiser and Graham Fidler in a blue kayak. Both powered boats used electric drive motors designed by EBA member Cedric Lynch.

The second leg of the event saw a considerable number of other vessels join in. The Mayor of St Ives, Councillor Ian Jackson and the Mayoress in their own traditionally topped electric craft, *Ripple*, together with many others in a variety of electric boats including the St Ives river trip boats and Mick Jones in the steel ice breaker from the family boatyard, arrived in St. Ives to the sound of boat horns, tumultuous shouting from hundreds of onlookers on the town's Chapel Bridge and on the Town Quay. EBA webmaster, Nick Goldring and his wife Yvonne demonstrated the versatility of their electric launch, *Silent Adventure*, whilst EBA membership secretary, Tony Dunning and his wife, Janet had joined *Annie III*.

Sunday saw the third leg of the challenge successfully completed with the arrival of *Annie III*, *Siren, Silent Adventure* and Graham Fidler in the kayak at the Fish and Duck Marina, Popes Corner, Ely. By this time Graham had paddled all the way from Bedford and negotiated the fifteen locks.

The final leg from Ely to Denver was a real challenge as the rain had started in the early hours and often with torrential downpours, never stopped all day. Nevertheless, *Annie III, Siren* and the kayak all braved the elements and over the day pressed on to the end. First to reach the Denver complex was *Siren* whose crew joined Jeff and Jacquie Hide for a well earned lunch in the Jenyns Arms. Tony and Janet Dunning acted as land transport and arrived just before *Annie III* and the kayak whose crews had prudently stopped off for lunch at the Ship Inn, Brandon Creek.

The four day Challenge, on the River Great Ouse ended in great satisfaction to all concerned and, as is always the case when electric boats are about, proved to be of tremendous interest to the many members of the public who stopped, looked and often engaged in conversation where the opportunity arose.

Hamble Ambled

Barbara Penniall reports on last summer's EBA cruise

A summertime cruise on an estuary sounded an exciting prospect for Electric Boat Association members, so when EBA member Hedley Bewes proposed organising a weekend on the Hamble, we jumped at the chance to take our boats on a salt water cruise. We launched at the Mercury Yacht Harbour which offered plenty of parking for cars and trailers and a good slipway. Once all assembled, we cruised up Badnam Creek to a quiet picnic spot to enjoy lunch. Refuelled on good food, sunshine and great company, we caught the ebb tide and sped down towards the Solent, passing some incredibly expensive yachts towering over our little fleet of electric craft. Reaching our destination for dinner that evening, we were welcomed at the new Prince Philip Yacht Haven where moorings and charging facilities were available for those who needed a boost for the next day.

Hedley then surpassed his obligation as host for the weekend as he organised a private trip over the 19 metre yacht *Mariquita* for EBA members. Launched in 1911, this beautiful Big Class yacht had been taking part in an event when she suffered a broken mast and had had to withdraw from the race to await major repairs.

Dinner at the Royal Southern Yacht Club overlooking the yacht basin completed a perfect day and we happily anticipated another cruise the following morning. We caught the flood tide and travelled together five miles to the Horse and Jockey at Curbridge. With a two hour window for the tide to turn, we had plenty of time to enjoy a pub meal in the sunshine before heading back on the ebb tide to complete a perfect weekend cruising.

Cruising with electric boats in good company is a major part of our social calendar. If you can suggest a suitable stretch of water – ideally for a weekend, but if not, just a day's cruise – then please do get in touch. You do not need to have a boat yourself, we can bring those, but points to consider are suitable launching facilities with parking for trailers and cars, stopping points for either a picnic or a pub meal and if a weekend cruise is organised, suggestions for an evening meal and local b&bs.

It is your Association and cruises are a great way to get together with other members and exchange ideas, help with projects or just have fun!

pictures by Barbara Penniall

The Hunt for Red October

EBA Chairman Jeff Hide reports on how he went about finding a suitable narrowboat for electric conversion

The Hunt for Red October was fiction, a political novel and a film starring Sean Connery. The hunt by my wife and me for a particular narrow boat was real but just as exciting. Red October, a nuclear powered and electrically propelled submarine, was concealed beneath the waters of the oceans – our narrow boat *Equinox* was concealed in the pages of the Internet, in magazines and the advertisements of brokerages. Red October worked submerged under water – *Equinox* should not or we are in trouble. Red October was found in a short time – our narrow boat took months to find.

So, why was it so difficult?

The answer was because we wanted an electric narrow boat. It is true that you can convert any boat to be driven by electricity. However, at what speed, with what acceleration, for how long and at what cost are just some of the considerations to be applied before and not after it is bought. To be successful a boat must have the correct potential to convert to electric propulsion.

Let me begin with the technical facts in simple language - electric propulsion for dummies perhaps, as I was when I first started to convert vessels to electric propulsion.

The shape of the boat's hull is probably the first important factor. It is that shape which will make the difference between hard-going through the water, causing a significant wake draining the batteries on one hand or slipping through the water with ease on the other. A blunt boat at the front (the bow) will have a hard job forcing the water aside and a blunt rear end (stern) will create a great wash as it pulls water into the area of the spinning propeller to gain forward motion. If the bow is sharp, like the blade of a knife it will cut through the water smoothly and with little ripple. If the stern is rounded or its shape turns gently from the horizontal part (hull bottom or keel) to the vertical (transom), very little wash will be created and less power used up.

The narrow boat's stability is its great weight and its ballast in the bottom of the hull.

The size of the vessel and its dimensions are the next consideration. The length of the boat should, ideally, be more than two and a half times the width (beam). The lower part of the hull on a narrow boat is called the swim and it is that which is under water. Its shape fits the formula.

The part of the hull mainly above water does not adversely affect the performance.

Having considered the shell of the boat, aiming for the best shape for efficiency, the next decision will concern the type of electric propulsion.

The simplest electric boat is a dinghy with an outboard clamped to the rear. There is a limit to the ability of an outboard electric motor to propel a boat although many boats of up to about 26 feet can use them. Examples include the GRP Wilderness series, the shorter Normans, old Springer Bugs and the smaller Sea Otters made of aluminium.

The simplicity and low cost of the outboard commends their use in appropriate craft but when the limits of the outboard have been reached, it is the inboard motor that is used.

Inboard electric motors are the more powerful generally but, of course, we have to consider not only the type of motor but also the question of the batteries. Keeping it simple, it is the voltage chosen for an electrical system which determines the rest of the equipment from the batteries, through the control box to the motor and onto the propeller. The voltage

has to be high enough to power the boat at the sort of speeds likely to be needed. These are from 4mph, the legal limit on most canals and non tidal waterways to 7mph. A 36 foot steel narrow boat would need at least a 36-72v system.

The lead acid battery is still in popular use today, especially to start the engines of vehicles and vessels using internal combustion engines, to supply domestic electricity to caravans, boats and other standard needs. The main advantage of this type of battery is that, by comparison, it is inexpensive and simple.

The lead crystal battery has a unique micro-porous, high-absorbency mat. In addition, the battery contains extra thick plates, cast from a high-quality lead calcium-selenium alloy. During the first charge and discharge cycle, the electrolyte solidifies, forming a non-toxic white crystalline powder. This results in a safe, high-performance, environmentally-friendly battery The lead crystal battery costs more than lead acid batteries but a lot less than lithium-ion ones.

Lithium-ion batteries are more like computer cells and without the need for lead or liquid are much lighter in weight. They also produce a great deal more electricity but are exorbitantly expensive at this time. Nevertheless often the cost can be justified for the performance needed. Lithium batteries need little by the way of servicing and can be used at any position. They are, of course, more complicated as they need programming much as a PC or laptop computer.

Back to my search for a narrow boat The Electric Boat Association already has members with electric narrow boats, one I recall was sixty feet long – that gave me confidence.

But I wanted to create one that was sufficient for my wife and me for weekends or a few days away; not a live aboard. I also wanted to minimise the outlay whilst, at the same time, having a reasonable amount of comfort. My wife's preference for a fixed double bed is not difficult to find on a long narrow boat. Most are between 55 and 70 feet long averaging 60 feet. But we wanted one a shorter one and these feature in only about 15% of narrow boats.

Thus, a narrow boat between 30 feet and 40 feet with a double fixed was a rarity. Added to that we wanted a decent shower, toilet and wash basin. Narrow boats of whatever the length tend to have one of three stern designs.

The traditional (trad) resembles the original narrow boats used by navigators in the earlier centuries and has very little space for the helmsman to stand and on which to use the tiller and throttle. This design does, however, give more space inside the body of the boat. Much credence is given to this design often with its painted castles and roses - traditional in every sense.

The semi-traditional design gives space at the stern for the helmsman but also some seating for those who prefer some company often with a glass of wine.

The third design is a development arising from the main purpose of narrow boating today which is social rather than just maintaining an historic culture. The cruiser stern provides about six feet of length with a rail (taff rail) around the rear edge for safety and sitting/leaning on and plenty of space for the friends with their conversation and victuals.

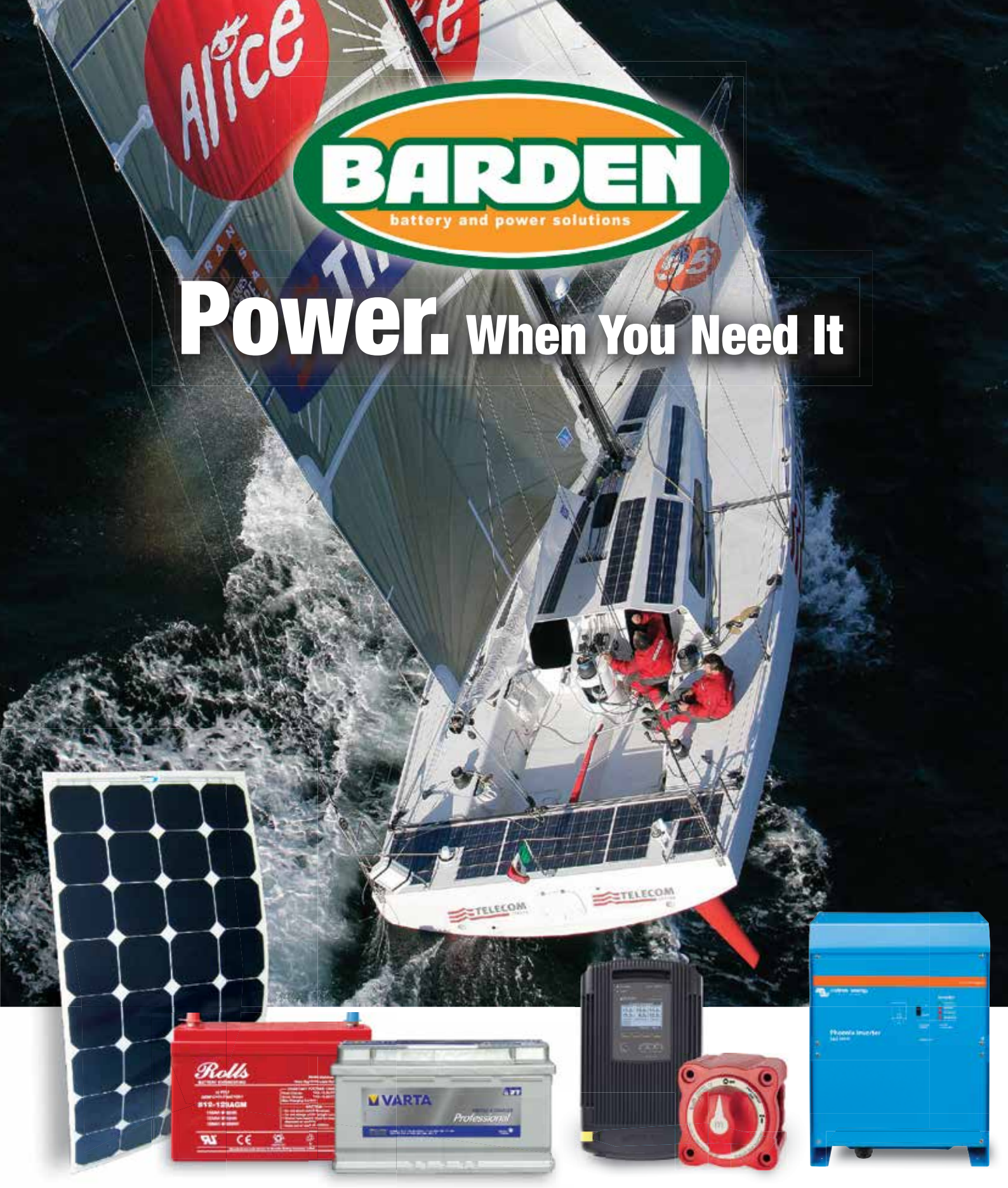
We preferred the cruiser stern but when added to all the other preferences, the range of choice diminished to just a few vessels.

Naturally I had to consider costs. Costs vary. My previous boat conversions were transported on a trailer towed behind my car and, as I kept them behind my home on my own land, I did not need to pay for mooring on a marina or anywhere else. I did not need to apply anti foul (blacking) as the boats were not kept on water. Neither were anodes necessary. No servicing was needed except for an overnight electric top up of the batteries. Insurance and a river licence were at a discount and an open electric boat with no other electric circuits (except propulsion) does not require a Boat Safety Certificate.

My plan for an electric narrow boat will be much more expensive.

None of the advantages in the paragraph immediately above will apply if I use any sort of internal combustion engine.

So, once everything else has been completed it will be time to count the pennies and consider the next step.



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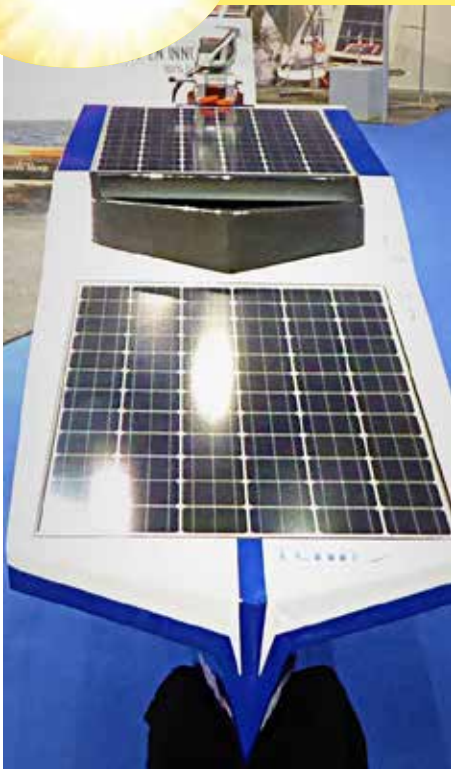
Solar Boats and Boating



Young Solar 2016 Challenge

The Boot Holland opening ceremony saw the unveiling of the new Young Solar boat designed by Naval Architects Sneeker Vripack.
Dennis Carton and Bart Bouwhuis told an enthusiastic audience about the development of the boat. Steam heated wood was used to create the hull shape which is optimised for high speeds. Dennis predicted that the new V5 boats even will be able to sail as fast as the larger solar boats, albeit very briefly. The Young Solar boat, called V5 is the third class of solar electric boat designed by Sneeker Vripack following on from the V20 solar boat (see page 16) and last year's design for the Frisian Mienskip boat. The V5 Young Solar boat is an improved version of the boat that is still seen in previous pictures and videos. The new boat is expected to match the performance but will also be considerably better in this class, in terms of maneuverability and speed.
For the Young Solar competitor class there is now a complete integrated package available comprising the hull Torqeedo outboard, Optima batteries, solar panels, control electronics and three junior classes where the teams are guided and coached for the race. Costs are kept low by the sponsorship of companies like Vripack, Quiet Boot, Polynautic, The Sun Factory, Brand Events and various local Netherlands institutions. The cost excluding VAT is €900 for a cutting package for the boat and the curriculum and €600 for the hire of motor, batteries, control electronics and solar panels.
The 2016 World cup for solar powered boats starts in Amsterdam 2 July and finishes in Leeuwarden 9 July. There is now an App to keep up to date with the latest developments.

Solar News

Artificial photosynthesis

Daniel Nocera, the Patterson Rockwood Professor of Energy at Harvard University, and Pamela Silver, the Elliott T and Onie H Adams Professor of Biochemistry and Systems Biology at Harvard Medical School, have co-created a system that uses solar energy to split water molecules and hydrogen-eating bacteria to produce liquid fuels.
'This is a true artificial photosynthesis system,' Nocera said.
'Before, people were using artificial photosynthesis for water-splitting, but this is a true A-to-Z system, and we've gone well over the efficiency of photosynthesis in nature.' While the study shows the system can be used to generate usable fuels, its potential doesn't end there, said Silver, 'The beauty of biology is that it's the world's greatest chemist - biology can do chemistry we can't do easily. In principle, we have a platform that can make any downstream carbon-based molecule'
Dubbed "bionic leaf 2.0", the new system builds on previous work by Nocera, Silver and others.
The system can now convert solar energy to biomass with 10 percent efficiency, Nocera said, far above the one percent seen in the fastest growing plants. Though there may yet be room for additional increases in efficiency, Nocera said the system is already effective enough to consider possible commercial applications but within a different model for technology translation.
'In many ways', Nocera said, 'the new system marks the fulfillment of the promise of his "artificial leaf" - which used solar power to split water and make hydrogen fuel.'
'If you think about it, photosynthesis is amazing,' he said. 'It takes sunlight, water and air - and then look at a tree. That's exactly what we did, but we do it significantly better, because we turn all that energy into a fuel.'

Solar Boats and Boating

Formula 1 Solar

The renowned Dutch Naval architects Sneeker Vripack have designed the V20, a solar-powered wing-in-ground (WIG) hydrofoiler, which they compare to Formula 1 racing because the techniques tested and developed for the V20 could benefit the wider industry. The idea for the V20, the world's first one-design solar class, came from the Netherlands' Frisian Nuon Solar Challenge (now called the DONG Energy Solar Challenge) which began in 2006 with three design classes. The top class has almost no restrictions, allowing teams to choose their own solar panels, while the A-class is a one-man class with solar panels supplied by the organization, and the B-class is a two-man class also with supplied solar panels.

After competing in the A-class for six years, however, Vripack wanted to move away from a design focus that tended to favour the biggest budget, and instead emphasize things like driver skills and tactics. They decided that if they created a one-class design, more and more people could compete, and as a result, technology would expotentially move toward R&D on the foils and props. Although the boats are small (6m/19.7'), this one-design racing class is one of the most important projects for Vripack, according to Jeroen Droogsma, manager of Vripack's design studio, because it provides the design team with information about new techniques that could have applications for bigger yachts.

'It is all about hull optimization,' Droogsma says. 'That factor alone is far more important than any other green initiative, be it on these very light solar-powered boats or the biggest of superyachts. Get the hull right, and the consumption will drop dramatically no matter what the size of the boat.'

As a one-design class, the solar-powered boats are identical, and following class rules, teams can choose different options for foils and propellers, or larger versus lighter-weight batteries.The solar panels that cover the V20's hulls convert solar power directly to an electric motor (4 kW/5.4 hp), The battery management system can assist the pilot in determining ideal speed. It is also possible for the V20 to run entirely on the sun's energy and recharge the battery at the same time. The Vripack design plans for the V20 cost €5,000.

World's largest solar boat

The largest solar powered boat in the world, now named *Race for Water*, was in Paris at the end of last year helping to promote the Race for Water Foundation campaign to tackle plastic waste entering the world's waterways and oceans.

The Foundation's plans to prevent waste from entering the waterways by giving it a value through an innovative technology that transforms waste into electricity. This model generates social, environmental and economic benefits and several coastal cities are already interested to implement it as of next year.

During the solar boat's stay in Paris, the Foundation also presented the 'Collector', a prototype boat that can collect macro waste in bays, lakes and rivers. It was developed by MOD SA and the Naval Industrie Lorientaise boatyard on behalf of Race for Water Foundation and has a cleaning capacity of 5,000m2 per hour with a yield of 500kg/hour. Waste absorbed at the front of the vessel travels to deck level on a conveyor belt before being stored in containers. Portable and versatile, the 'Collector' meets the needs of the community and the cleaning companies no matter the expanse of water. This vessel contributes greatly to the pioneering solutions the Race for Water Foundation wants to action in 2016.

'*Race for Water* attracts amazing public and media attention to our cause and our message,' said Marco Simeoni President of the Foundation.

Solar Boats and Boating

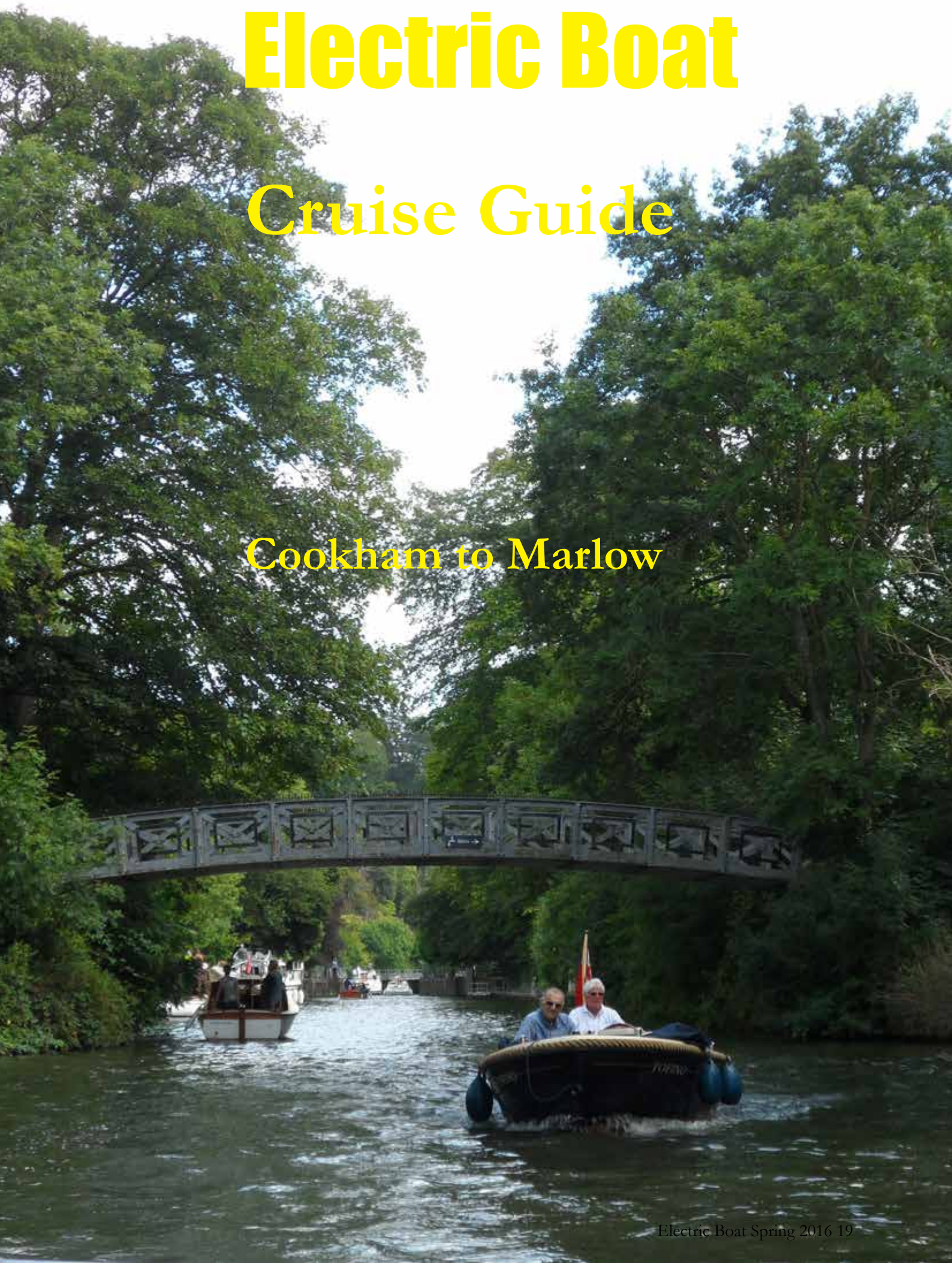
EBA business member Nancy Frainetti is the founder and president of The Electric Marina Inc, Florida's first electric boat rental in St Petersburg. Nancy has developed a business partnership with Island Packet Yachts and the latest lifestyle launch was designed with families in mind.
Nancy's sister Paula has over 29 years experience in healthcare and is the founder of MetaFit Solutions set up to help people make health changes for disease prevention and to manage chronic illness.

At the end of last year two women in their Island Packet L24e, a 24' all-electric with 600 watts of solar-assistance, travelled 360 miles from Miami to Jacksonville, Florida to raise donations for breast cancer staying each night along the route at Florida DEP's Green Lodging and Clean Marina locations.
Nancy Frainetti, owner of The Electric Marina and her first mate and sister, Paula Frainetti, owner of Metafit Solutions made their maiden 9-day voyage on the IntraCoastal Waterway, for a good cause. The Donna Foundation, is a nonprofit organization that financially assists breast cancer patients to alleviate financial stress, so they can concentrate on being a survivor.
By the time they had reached their final destination, Billy's Boathouse Grill in Jacksonville, the sisters' were well on the way to reaching their sponsorship target of $10,000.
The Island Packet L24e is a new lifestyle launch series, by 36 year old yacht manufacturer, Island Packet Yachts'. Its steerable electric pod drive, a 6.5kW (9HP) 48 volt system, eliminates traditional propulsion components and their continual maintenance requirements. Other no maintenance features include the Mastervolt's AGM (absorbed glass mat) batteries, chargers and converter allowing for up to 10 plus hours of 5 knot cruising. Supplementing the amperage of the batteries is 600 watt photovoltaic systems incorporated onto the L24's hardtop canopy, which is remote controlled and lowers to become a cockpit cover, protecting and securing the Island Packet L24's interior. The launch can cruise all day for less than $2 of electricity.

Electric Boat

Cruise Guide

Cookham to Marlow



Cruise Guide

Cookham to Marlow

We return again to the River Thames and to a favourite cruising stretch of a waterway that has carried electric boats from their earliest appearance in the late nineteenth century. Our twenty first century cruise is only over approximately four miles but there are two locks to negotiate and, for a leisurely trip, time is more important than distance. Unless the locks are very busy, Marlow should be reached with enough of the day left to explore this historic Thames river crossing town.

Our cruise starts a little way downstream from Cookham Lock at Cliveden Deep which as we head upstream gives an excellent view of Cliveden House perched above the woods. Approaching Cookham Lock we pass on the left the former site of the My Lady Ferry which use to connect the Berkshire and Buckingham shores. Cookham Lock has a rise of 1.30m and has facilities for water filling and electric charging. On leaving the lock care needs to be taken at the footbridge which is the lowest on this section of the river. It has a curved soffit and it is advisable to keep to the centre of the river at this point. The entrances to the two weir streams are on the left at the end of the lock cut and the shingle slipway next to the Ferry Inn is on the same side a little further on. The slipway is a public launching site but

Cruise Location

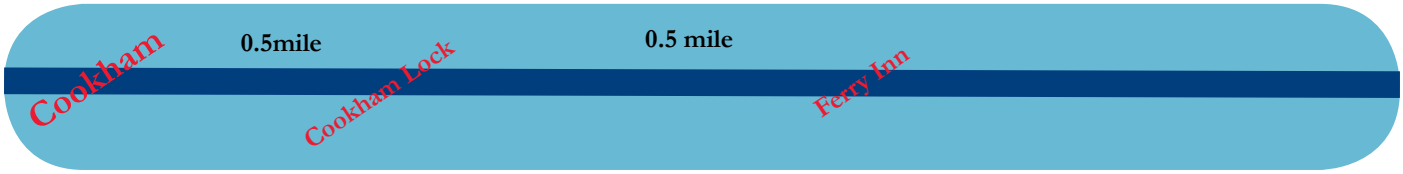
River Condition Warning Boards

Displayed at locks during dangerous river conditions.

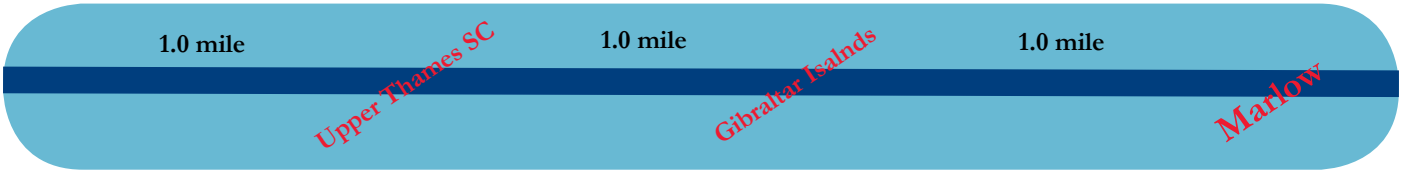
RED Strong Stream Warning - all boats advised to stop immediately. Hire boats to contact operator

YELLOW Stream Increasing Warning - powered boats advised to find safe mooring. Unpowered boats to stop.

YELLOW Stream Decreasing Warning - power boats advised to navigate with caution. Unpowered boats to stop.



the moorings above it are reserved for the customers of the restaurant. The next landmark is Cookham Bridge which first replaced the ferry in 1840 although the present bridge was built in 1867. Further on the little white jetty running out from the left bank towing path is a Salter's Steamer point although today the landing is rarely used except for charter trips. The Cookham Reach Sailing Club is then passed on the same side of the river and is the first of the two sailing clubs that operate in the stretch of river betweeen Cookham and Marlow. In summer dinghy racing is very popular and it is good practice to give the racers' marker buoys a wide berth and to try and be mindful of which way the dinghies will want to use the wind. Keeping as close to the trees as possible in tree lined stretches of the river is often a good route because the trees can create odd air currents and unpredicatable eddies. The more expereinced sailor will usually stay clear of these areas. The Cookham Club race below Bourne End rail bridge and the Upper Thames Sailing Club set out their race track in Bourne End Reach, a little way above the bridge at the head of Bourne End Marina jetties. Most sailing dinghies will have turned before the lower of Gibraltar Islands which should be left to port as we head upstream. However the quieter backwaters below Winter Hill are navigable in a skiff or small day launch. It is possibe to moor on the lower island but the higher island is private. Woottens Boatyard is passed on the left bank and there are moorings on the opposite bank. The river then turns away from Winter Hill towards the Marlow Bypass bridge and the final approach to Marlow Lock. The Longridge Boating Centre which is run by an independent charity is also on the left bank and novice canoeists and dinghy sailors are often using the river betweeen the turn and the Lock weir stream. Below Marlow lock there are moorings on the right bank as we approach the lock cut. Marlow Lock has a high rise level of 2.16m (7ft) in the lock chamber and if possible it is best to send a crew member ahead to take the lines when the lock is very busy. Once through the lock the famous view of Marlow Bridge is in front and it is necessary to maintain a middle course avoiding the weir on the left and the shallows on the right. Just before the bridge there is a public slipway on the right at the bottom of the road leading into Marlow. Above the bridge there are Council controlled moorings on the town side of the river bank as far as the towing path bridge. Those wanting to visit Marlow will need to follow the Thames Path to reach High Street.



Info

Launching

Trailed boats can launch using public slipways at the Ferry Inn Cookham and Peter Street Marlow

Licences

If visiting the Thames from another waterway a Short Period Licence can be obtained either by downloading the form from the EA site and applying by post (can take up to 10 working days) or direct by debit or credit card from Thames lockkeepers (will need downloaded form). Licences can be bought for 1 day, 7 consecutive days or 31 days and the fee is calculated by the length and beam of the craft. A 25% discount is offered to electric boats.

www.environment-agency.gov.uk

Pubs

The Chequers
53 High Street
Marlow
SL7 1BA
01628 482053
Lunchtime and evening meals
www.thechequersmarlow.co.uk

Baroosh
56 High Street
Marlow
SL7 1AH
Tel: 01628 472878
Pub garden
Lunchtime and evening meals
www.baroosh.co.uk

The Two Brewers
St Peter Street
Marlow
SL7 1NQ
Tel: 01628 484140
Lunchtime and evening meals
www.twobrewersmarlow.co.uk

Tourist Information

Marlow Library
Institute Road
SL7 1BL
Tel: 01628 483597
www.wycombe.gov.uk

Marlow

Marlow, formerly known as Great Marlow, Marlow is an attractive medieval market town and its historic core is a conservation area. The first record of Marlow dates from 1015 when it was called Mere lafan in Old English meaning "land left after the draining of a pond". In medieval times the town was an important embarkation point for goods from the surrounding landscape to supply the London markets. Boats and barges carried timber and firewood as well as flour, corn and malt, and the riverside was lined with wharves and jetties. River trade gradually declined in the late eighteenth and nineteenth centuries. The centre of the town, High Street, West Street, Spittal Street and Chapel Street, is a conservation area with 163 listed buildings. It has a basic grid layout that overlies the older medieval street pattern and is dominated by High Street which runs from the southern end of the Grade I listed Marlow Suspension Bridge designed by William Tierney Clark in 1832.

Charging points

There are charging facilities at a number of locks on the Thames.

For this cruise the most convenient charging point is at Cookham Lock.

The EBA also provides a list of members willing to offer charging facilities to other members.

Contact: secretary@eboat.org.uk

Future cruises

Where next?

Have you got a favourite waterway to recommend for a day's cruise? Has it got things to see, places to go?
Can you take a good digital picture?

Contact: editor@eboat.org.uk

Chequers

The Churchill Bar in this recently renovated Brakspear pub has a range of craft beer and real ale. The building dates back to the sixteenth century and seems to have always been been a pub serving ale since this time.

Electric Boat

Kevin Desmond
the founder editor of the Electric Boat magazine reports on electric boats around the world

Ponte Rialto,Venice

H2 in Venice

Venice, Italy is soon to have its hydrogen fuel-cell ferry. Thanks to funding from the Veneto Region, the project "HEPIC - Hydrogen Electric Passenger Venice Boat" construction of the first unit is run by a joint venture called "Hydrogen Park Water Green Mobility", which has as leader the Venetian Alilaguna and includes the shipyard Vizianello and start-ups EconBoard. The H2 park in Marghera has been in existence for ten years and here is a new application. The technology is provided by Enel Distribuzione (Italy's electricity provider) for the infrastructure of the electric movement, and Dolomitech, producer of thirty hydrogen buses used at the World Nordic Skiing held in Val di Fiemme in 2013. With twenty pounds of hydrogen, giving it an autonomy of 9 hours, the first HEPIC will complete its trials in 2016

North Sea, Holland

Freefall Lifeboats

Verhoef, the Dutch pioneer of aluminium crane-launched freefall lifeboats has now successfully performed full-scale tests along the Dutch North Sea Coast with the first freefall lifeboat, powered by an electric motor and an advanced type of LI-ion battery set. Tests showed already the immediate benefit, the highest level of reliability and improved human comfort as the electric powered engine does not make any noise. In 1961 Joost Verhoef, the founder of Verhoef, built and tested the first freefall lifeboat(s) in the world. The design went into service on a ship in 1962. It had a freefall height of about six meters, and was made entirely made of aluminium alloys.

Bordeaux, France

Le Green Boat

After five years of campaigning, *Le GREENBOAT®*, an 18-metre long passenger boat with 1m10 draft, its hard chine bows resembling the regional pinnace, has gone into operation on the water of the Bassin d'Arcachon, near Bordeaux, France. Godfather to the boat is ex-footballer Jean-Pierre Papin who achieved his greatest success while playing for Olympique Marseille between 1986 and 1992. *Le GREENBOAT®* can carry 52 passengers and 20 bicycles. Its hull was built at the Dubourdieu Shipyard at Gujan-Mestras using timber from the regional Landes forest: layers of pine and on board furniture in

acacia. Motorisation is hybrid-electric with two 120 kW Baudouin 4W105S diesel engines coupled to two 37 kW Leroy Somer LS160 electric motors, giving top speeds of 15.5 knots and 5 knots respectively. There are 50 kW of Regen batteries. The boat has been in part financed by COBAS the local Arcachon Community. Emmanuel Martin of Dubourdieu plans to convert *Le GREENBOAT®* to zero emission, working with Symbiocell specialised in hydrogen propulsion.

International

Marina Bay, Singapore

Robocats

Who needs a pilot or crew? Forget the Google driverless or the drone!
In October 2014, 15 university teams from Australia, Japan, Singapore, South Korea and the United States, competed in the inaugural Maritime Robots Challenge. Jointly organized by the Association for Unmanned Vehicle Systems International (USA) and the National University of Singapore's (NUS) Faculty of Engineering and Science Centre.
The challenge consisted of fitting out a standard 16ft rigid inflatable catamaran, powered by two electric trolling outboards, with sensors, computers and software. The "robocats" were required to complete a highly sophisticated orienteering course in Marina Bay in both searing heat and torrential downpour conditions. The winning team was comprised of students from MIT's Department of Mechanical Engineering and Computer Science and Artificial Intelligence Laboratory (CSAIL) as well as students from Olin College of Engineering.
The next running of the RobotX Challenge will be held on the island of Oahu, Hawaii in December 2016.

Cape Town, South Africa

FloatBoats

A FloatBall is a 10-seater Torqeedo Cruise 2.0-engined boat looking like an igloo: it features flat screen TVs and 4G Wifi, a hydraulic ceiling, panoramic windows and can be equipped with LED backlighting that provides a nightview. In 2006, Peter Jacops formed the Whisper Boat Building Academy for the Deaf in Khayelitsha and before long they had come up with what they called Time Whisper Ball. With the help of catamaran builder Wayne Robertson Yachts, some sixteen of them were built and floated around the V&A waterfront in Cape Town, South Africa during the 2010 Soccer World Cup and for

6 months after it. The Academy won the South African Boating award 2010 for most innovative product of the year. Renamed FloatBall, a business was created in 2013 by a group of entrepreneurs in the nautical, sports and digital media markets, led by Brazilian Giovanni Luigi, former CEO of Yacht Collection and a Mastercard director. More than 15,000 families already have experienced FloatBall voyages in Rio de Janeiro, Brazil. Additionally, thousands more from 80 different countries had the experience of sightseeing during the 2014 FIFA World Cup in Brazil this year.
In 2014, Zoo Miami in partnership with Aquatic Sports, LLC took delivery of a FloatBall fleet at the Amazon Lake at "Amazon and Beyond."

Lady Charlotte

With information provided by Simon McMurtrie, Lady Charlotte's present owner, and photographs by Michael English, Barbara Penniall continues her research into electric boating history.

Lady Charlotte is a beautiful 43ft river launch owned by EBA member, Simon McMurtrie but she started life in 1914 as a steam launch named after the Duke of Westminster's racehorse, *Flying Fox*. Built on the River Dee of riveted steel, which was a very new form of construction at that time, she had a clipper bow and generous aft counter.

After the First World War she was used by the Duke of Westminster to entertain war wounded at Eaton Hall. Sold in 1923 and moved to Bristol, a string of owners followed until 1974, when she was pretty well derelict and EBA member David Higgins bought her for £44. David built a cabin which occupied a third of the boat running aft right back to the stern with a long forward cockpit. He also installed a steam plant and *Flying Fox* occupied a berth on Lake Como, at his Italian home.

In 2007 she was bought by Brian Clark of Bithells in Chester and returned to the River Dee with the intention of being used for luxury hire but Brian hadn't allowed for the 90 minutes each time to prepare and fire up the steam engine, so once again she was on the market. At that time, Simon McMurtrie had been looking for a suitable boat to use for relaxation on the River Thames and as an admirer of Colin Henwood's restorations, he asked Colin to find a suitable craft and install an electric motor – the perfect way to cruise. Again, an EBA business member came to the rescue and Gillian Nahum of Henley Sales and Charter offered the *Flying Fox* as a potentially suitable launch.

Colin Henwood removed the steam plant and installed an electric motor. After a general sprucing up and a coat of fresh paint, Simon was able to use the boat for three seasons, getting to know her and giving himself time to decide what he would like in order to achieve a perfect restoration.

The final restoration began in 2012 and Michael Williams was asked to take the hull to Southampton to refit any of the steel plates that could be reused and replace those that were too worn or had been incorrectly riveted during work in the 1970s. *Lady Charlotte* was then moved to Colin Henwood's base outside Henley, for the lengthy task of bringing the boat back to life.

Working with fellow EBA member and architect Andrew Wolstenholme, the result is stunning with a modern feel while still retaining the traditional Edwardian theme. Mahogany for the cabin was sourced in Warwickshire, the enclosed saloon is now a little aft of midships, leaving space for a small stern cockpit and a large forward one shaded with an extension of the saloon roof. Another EBA business member, Thames Electric Launch Company installed a 15kW Ecodrive system with 24 Manbat batteries, giving a top speed of 10-12 knots and a long range at lower speeds.

So a centenary after her original launch, the *Lady Charlotte* was ready to cruise and quite rightly, in 2015 she won the Classic Boat magazine's 'Powered Boat of the Year' award. *Lady Charlotte* also stole the show at the Thames Traditional Boat Rally, winning not only the Osland Trophy for structural restoration but the Simonds Trophy for electric powered craft.

And the name? Charlotte is the middle name of Simon's daughter and the addition of Lady is in recognition of the Lady Helen, a beautiful craft previously restored by Colin Henwood, the work that convinced Simon McMurtrie that Colin Henwood had to be the craftsman who brought his boat back to life.

If anyone owns, or knows of an electric boat that would prove to be an interesting article for the historical series, please contact Barbara Penniall,

secretary@eboat.org.uk

Amazon Kindle Fire 7

Now that the magazine has gone digital Don Wright checks out an entry level e-reader so that he can continue to enjoy reading Electric Boat in all his usual haunts, and Kevin Desmond who has had a Kindle Fire 7 for some time also gives his approval.

The first thing to say about the Kindle Fire 7 tablet is that you can buy one in Tesco for £49 or for£49.99 online from Amazon including free UK delivery. It is by far the cheapest tablet on the market and while it does not match the specification of more expensive competitors it is an ideal entry level e-reader for Electric Boat. It will of course do much more and Amazon are most likely pricing the Fire 7 at cost because it is a window to all their online media services.

The new Fire is the only tablet in Amazon's current range that doesn't have the HD tag but its 7-inch, 1,024 x 600 display isn't too far off the 720p high-definition standard. But with only 171 pixels per inch, the lack of resolution can be noticeable on close viewing. However an HD display isn't absolutely necessary for reading, checking emails, browsing the web or playing the odd game. It is worth repeating that for £50 you're not going to get a tablet that is going to compete with the Apple iPad in terms of specs and performance.

All the new Fire tablets run on Amazon's heavily customised Android operating system and the Amazon Fire OS will not support any Google apps. However Amazon's equivalent Silk browser, calendar, email and file manager apps are very adequate substitutes. The Amazon Appstore isn't as well-stocked as Google's, but you would be unlucky not to find whatever it is you're looking for (or at least an app that does the same job), and many of the Amazon apps are free compared with other app stores. But for the more computer literate it is possible to download and install the Android APK file (the technical knowhow is minimal and nothing a quick Google search won't cover) which will then allow the Fire to use Google apps. If you want to use the Fire 7 as something more than just a magazine reader it is probably best to buy the model with 16GB of internal storage which costs another £10 compared with the standard 8GB version because 3GB of available storage is taken up by the operating system. But the new Fire 7 now has a microSD slot which will support cards up to 128GB, and Amazon is planning to release a software update that will allow downloaded Prime Music tracks to be stored on the microSD card. Amazon's new Fire isn't aimed at graphic design students, and it isn't made for videophiles. But most people use tablets for the same basic things; the odd email, browsing, reading, playing games, and watching videos. The Fire is perfectly capable of doing all these things without a problem and it only costs as much as a couple of rounds of drinks at your local bar (ed: in Henley on Thames anyway).

To stand the Fire 7 on a table for easy reading I bought a 360 degree rotating leather stand case on Ebay for £2.49 (with free delivery).

"I have recently become the owner of Kindle Fire which enables me, when I am reading books - to choose the size and typeface, the colour of the paper, to view sharp colour images and to turn the pages by right-to-left swiping either with my finger or a stilo. I can also download magazines, music, audiobooks etc. I was very pleased to see that people can now download my biography of the pioneer of electric boating "Gustave Trouvé - French Electrical Genius". Unlike ordering on line and waiting up to two weeks for it to come, I can download it in less than five minutes. The illustrations are as precise as in the paper copy. And it is half the price - let us plant trees, not use them to print dust-gathering books! It looks pretty good - and it was interesting to swipe the pages and to use thumb and index finger to enlarge.....Kevin

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