MOTOR BOAT & YACHTING

GO ELECTRIC!

POWERED BY RAND

PLUG & PLAY
All the reasons to get onboard this year.

+

CARL KAI RAND INTERVIEWED
A CEO's take on the evolution of electric boats

THE FUTURE IS NOW

Your essential guide to the world of electric boats

A BRIEF HISTORY OF ELECTRIC BOATS

Few people realise that the electric boat is over 150 years old but now they are back and better than ever.

The first record of a boat being powered by electricity dates back to 1838 when Moritz Hermann von Jacobi demonstrated a 28ft paddle boat to Tsar Nicholas 1. However, it wasn't until the development of the rechargeable lead-acid battery that Gustave Trouve built the first electric boat in a form that we would recognise today. He mounted a propeller in the rudder of a 5m skiff, driven by an electric motor he made himself. His craft achieved a speed of 6km/h on the River Seine in Paris on 26th May 1881.

His invention ushered in a golden age of electric boats, with hundreds of battery driven vessels being built in Europe, the UK and North America. On the River Thames alone there were over 400 registered electric craft in 1900. Cleaner, quieter and more practical than their steam driven counterparts, they were the Teslas of their day.

It wasn't until the outbreak of WW1 in 1914, triggering a sudden demand for light, powerful petrol engines, that electric boats faded into obscurity for the best part of a century. However, in the last ten years, concerns about global warming and rapid developments in both battery and motor technology have kick started a new era of electric boats. The latest generation of battery powered craft are just as quick as their petrol and diesel rivals but quieter, cleaner and less polluting. And leading the charge is Danish firm RAND Boats.

Trouvé's electric skiff on the River Seine

In 1881 Gustave Trouve built the first successful electric boat in a form that we would recognise today. He mounted a propeller in the rudder of a 5m skiff.

10 REASONS WHY ELECTRIC BOATS MAKE BETTER SENSE

1 ELECTRIC ENGINES ARE CHEAPER OVER TIME. An electric engine may be more expensive initially but you can wave goodbye to sky high fuel bills and maintenance costs, saving money in the long run.

2 NO NOISE OR SMELL. Cruising is more relaxing without petrol or diesel fumes and a noisy engine spoiling your fun.

3 MINIMAL MAINTENANCE. Electric motors have no filters, fluids or seals to change, so you spend less time on the dock and more on the water.

4 SUSTAINABLE BOATING. Electric boats have no impact on the environment, so you can enjoy as many trips as you want with a completely clean conscience.

5 SPORTY HANDLING. RAND Boats is the first manufacturer to offer electric boats with a sterndrive, giving you the same sporty handling as a petrol boat but with even better acceleration due to the instant thrust.

6 CHARGE OVERNIGHT. No need to find a fuel dock or carry cans of petrol to the boat, just plug in your boat overnight with a standard 16A marina shore supply or a fast charger, and it will be fully charged by the morning.

7 PLUG-AND-PLAY SIMPLICITY. No warming up the engine, no clunky dropping in and out of gear, just press the button and go.

8 FUTURE PROOF. Several countries are starting to ban petrol boats in sensitive waterways so going electric now ensures you will be able use and resell your boat wherever and whenever you want to.

9 INTELLIGENT BOATING. A more advanced interface system with live updates via an app on your phone enables you to keep track of your boat at all times.

10 ALL THE RANGE YOU NEED. Most owners of day boats rarely cover more than 40km in a day so with a planing range of up to 80km Rand's range of electric boats should have all the power you need.

LEADING THE CHARGE

Quieter, cheaper, easier to use – there are many perks to going electric. What will be yours?

There are many reasons why you should buy an electric boat. Firstly it enhances the experience for you and your guests. Secondly it protects the local environment and wildlife, thirdly it helps protect the global climate, and finally it makes good economic sense.

Onboard an electric boat there is no noise, vibration and smoke from a conventional petrol or diesel engine. Everyone can talk to each other as if they were sitting on your patio or the waterside. This is especially important on smaller day boats, where you would otherwise be less than a few feet away from a noisy petrol engine, which will still be intrusive no matter how well insulated it is. The only sound you will hear is the water rippling past your hull, or the calls of the wildlife. The pleasure becomes the journey, not the getting there.

An electric boat is easier to drive and handle, with fingertip control of motor speed from zero rpm up to full power. No thump as you go into gear, and jerk as you set off at speed. Instead you can inch your way round the marina and into your berth, or slip silently into the most secluded idyllic mooring. No problems pull-starting a small outboard – just turn the switch and you are immediately in control.

Everything is plug and play, with most boats connecting to a standard 16A marina shore supply for overnight charging, and fast chargers coming on line, so no need to find a fuel dock, or carry cans of petrol down to the boat. Or you can charge using solar panels on the boat or ashore.

An electric boat has no impact on the local environment. No exhaust polluting the water or oil slicks on the surface when you pump the bilge. No clouds of smoke following you or drifting across the water. No noise to disturb the wildlife – in fact getting close to wildfowl or watching them without them knowing you are there is one of the great pleasures of your trip. And your neighbours will appreciate the silence when you set of on a moonlight cruise.

And of course electric boats play their part in reducing global climate change. Electricity can now be generated by sustainable means. Batteries can be recycled, with up to 95% of the material in either lead-acid or Lithium cells being re-useable, and the

motors are mainly aluminium and copper, which is easily melted down and re-used.

Finally an electric boat makes economic sense to the owner. You can wave goodbye to wallet-busting fuel bills, as electricity doesn't have fuel duty on it at the moment, and charging overnight means you can take advantage of off-peak tariffs. Or as we have said, you can install an array of solar panels onboard or alongside your berth and get your power free from the sun.

Modern batteries have a long life, with up to 10 years or more use if they are properly looked after, and require minimal maintenance or winterising, as does the motor itself. Brushless motors have a service life of 30,000 hours or more, and the electronic controller will give a downloadable history allowing monitoring of usage and advance warning of any problems. So no more hefty service and layup bills.

So which boats can be made electric? Well the answer is just about all of them.

Canoes and dinghies can have a simple and cheap portable electric outboard and battery to give a break from paddling, or push you against wind or current, and you can take these home to c harge them up.

Dayboats are ideal candidates, with their battery packs giving a full day's smooth silent cruising, charging up overnight from a standard marina supply.

Cruisers can be all electric, or hybrid diesel/ electric if you want extra range, or need higher speeds for rivers and open water. The batteries can be charged from the shore or the main engine, or from solar panels on the roof.

Sailing boats can use electric power just to get on and off a mooring, or in and out of the marina, or for longer passages with enough batteries. These can be charged from solar panels, shore supply, or re-gen from the prop while sailing.

Sea-going motorboats will tend to use hybrid systems as they need the power and flexibility of a main engine for long fast passages.

Finally the latest superyachts are now being built with hybrid propulsion, with electric drives allowing them to manoeuvre in the marina, or visit environmentally-sensitive areas such as the Galapagos Islands without the need to fire up their huge main engines. Or they can travel along restricted waterways at slow speeds without having to run their main engines at inefficient and damaging low rpm for long stretches.

An electric boat makes economic sense to the owner. You can wave goodbye to wallet-busting fuel bills

CLOCKWISE FROM LEFT: The Rand Play 24 offers fast, quiet fun for all; Spirit 25 the lifestyle racer, Danish design at its best; the Mana 23's sociable cockpit

TECH AT YOUR FINGERTIPS

RAND Boats are disrupting the traditional boating industry, with their revolutionary electric boats and engines.

Electric motors can be either inboard, outboard, saildrive or hybrid. Their power is measured in kW, with 1kW = 1.33hp. The power rating of some electric motors may appear low compared to a petrol engine but an electric motor can run at full power continuously with no additional noise or stress, whereas petrol engines are not designed to run at full power continuously.

Rand Boats offer a wide range of different electric motors on their craft, from a super efficient 6kW (5hp) Torqeedo electric outboard on its entry-level Picnic 18 up to a mind-blowing 460kW (612hp) option on its largest Escape 30 model.

Outboards can either have their motor at the top, as with a petrol engine, driving through a vertical shaft, or underwater connected directly to the prop. In their low powers they are suitable for dinghies or day boats, but they can go up to 12kW for larger boats, and some units are now available with powers up to 150kW or more for planing sportsboats, though you will need a correspondingly large battery pack to ensure a suitably long range.

Hybrids systems usually comprise an inboard diesel, directly coupled to the shaft, with a separate electric motor driving the same shaft. This motor can either be alongside the shaft, connected through pulleys and belts, in which case it is called a parallel system. Or the electric motor can be inline with the prop shaft, sometimes within the main engine gearbox, and called a series system.

Motor technology has advance rapidly over recent years, from a time when a 2kW motor weighed 40kg, to today when for the same weight you will get 100kW or more. Modern motors are usually brushless, removing one of the regular maintenance items and making them more reliable in the damp atmosphere of a boat.

But you have to remember an electric motor can run at full power continuously with no more noise

Until recently most electric boats have had to use a simple shaft drive system with rudder steering rather than the more sporty sterndrives used in most petrol powered sportsboats. However, RAND Boats have now developed electric engines with sterndrives, making them easier to manoeuvre around a marina and more fun to drive at speed due to the quicker steering.

Batteries will be either lead-acid or Lithium. Lead-acid was the preferred system for 150 years but latterly Lithium, or more accurately Lithium Ion cells are now the norm. These are up to 1/5 the weight, and give more useable power but at a three to four times the price. They are ideal for faster planing boat where weight is critical.

RAND Boats builds all its craft using a lightweight construction process and an innovative wave-piercing hull design that is optimized for electric boating. This measn they consume 30-60% less electricity giving a longer range than any other competitive boats.

LEFT: Escape 30 and Supreme 27.

BELOW: Picnic 18 and Leisure 28.

Q&A WITH CARL

We caught up with RAND Boats CEO, CARL KAI RAND, for his take on how the boating world is navigating the exciting new world of electric.

Can you outline some of the reason behind the renewed interest in electric boating in recent years?

"The resurgence of interest in electric boats in the 1980s was driven by worldwide environmental concerns about pollution of the water and air of many inland waterways, lakes and cities by internal combustion engines.

This prompted technical developments of motors, batteries and hull designs to the point where boats can give over 25 miles range at planing speeds, 100 miles at 5 knots, and a full day's sailing with mixed use water activities. These developments have also made it possible for RAND Boats to mass-produce the world's first fully electric sportsboat costing less than 100.000 Euros, called Source 22, that will be launched in 2022.

What features make electric power particularly suited to boats?

"The high discharge rates of modern batteries and powers of high tech, lightweight propulsion systems now give comparable performance to petrol powered speedboats at 35-50 knots. This is coupled with specialised hull design and hydrodynamic efficiency through CFD and advanced simulation technologies, and lightweight construction.

Electric power is now the preferred propulsion for ferries and coastal vessels with shorter routes.

Advances in house load battery management systems and support from solar panels are eliminating the need for Gensets on leisure yachts and boats, and can also be found in combination with hybrid propulsion systems and pure electric.

The latest superyachts feature hybrid propulsion systems to remove the need to run their huge main diesels at slow speeds and in environmentally sensitive waters.

What are the environmental benefits of electric power?

"Fuel fillers and drains on boats, and the bilges are very susceptible to spills and leaks of lubricating oil and fuels which discharge straight into the marine environment and cause direct harm. Many outboards and marine inboards burn their fuel less efficiently than the highly regulated and developed car industry, and pump their exhaust straight into the water. This means the conversion to electric power in boats has an even greater beneficial impact than on the road.

Electric boats eliminate pollution of the local environment, and the global environment if they are charged with sustainably produced electricity or solar panels.

Larger boats can use solar panels to extend their range, and because of their relatively infrequent use, the panels can often deliver the full recharge cycle.

Batteries and motors are almost completely recyclable, and the use of sustainable composite materials and lightweight construction contribute to a much lower carbon footprint for an electric boat.

What makes electric boats so easy to use and maintain?

"Electric boats are easy to start, easy to drive, and quiet – you can talk to your passengers onboard at all times, and they don't disturb other boaters or the local wildlife.

They are easy to charge, just plugging into a standard 16A marina shore supply at every berth for overnight charging, giving the capacity and range for a full day's cruising, with the option of fast chargers for high usage applications.

They can even be use as off-grid battery storage for your waterside smart-home system.

They are low maintenance, with no need to service an i/c engine or lay it up for the winter.

And what of the future?

"The next major development will be waterside fast chargers, and these are already appearing at some marinas and hotels, in some cases serving cars as well as boats.

The main development in batteries was the move from lead-acid to Lithium. At present capacity and range from these is sufficient, and while automotive cells are giving even more capacity, close to 400Wh/kg. RAND Boats is one of the few boat manufacturers to have access to this technology.

The speed of reduction in price per kWh is the only remaining limitation that affects the timeline for when electric boats will replace traditional combustion-engined motorboats, but RAND expect that by 2025 the majority of new leisure boats will be sold with electric power.

And of course, following the trend in automotive developments, hydrogen power will eventually arrive in marine use.

The high discharge rates of modern batteries now give comparable performance to petrol powered speedboats

SPORTS TO SOCIALISING

– it's up to you! For full range, see ***randboats.com***

SPIRIT 25

The Spirit 25 is a walkround sportsboat that combines performance with style and practicality. The convertible seating allows six people to enjoy the best of both worlds. Fold the seats forward and they can enjoy the performance of speeds up to 40 knots (46mph). Fold the helm seat over and they can sit round a generous table for eating and drinking. Open up the aft seat and it forms a sunlounger that leads onto the bathing platform.

Power comes from seven options of sterndrive petrol, outboard petrol or electric, giving speeds of up to 55mph from the petrol engines, and 46mph from the electric options, with the 200kW Edrive and 80kWh Lithium battery pack giving a range of 100+ miles cruising, 28 miles at maximum. Whatever the power, as with all Rand designs the boat is built with sustainability at the forefront, with lightweight construction, recycled materials, sustainably sourced timbers and low resistance hull design.

SPECIFICATION

Hull length 750 cm
Hull width 255 cm
Draft 35 cm
Maximum power 160kW
Weight ex. engine 1250 kg
Maximum crew 9 persons
Cost from €169.900

MANA 23

The Mana 23 is the ultimate and most stylish electric day cruiser on the market. The open day cruiser has a unique functional layout able to accommodate up to 10 people with dining area located in the bow and a double aft sun lounge with extendable backrest. By placing the majority of seats in the front, the Mana 23 furthermore allows the captain to partake in the conversation while having great visibility of crew members.

SPECIFICATION

Hull length 720 cm
Hull width 230 cm
Draft 25 cm
Maximum power 30kW
Weight 690 kg
Maximum crew 10 persons
Cost from €53.900

ESCAPE 30

The Escape 30 is a unique day yacht with a bowrider layout that makes clever use of space to allow up to 12 people to enjoy the water in five different seating areas. A hardtop keeps the sun and rain off, while a cuddy cabin forward provides overnight accommodation for two with a double bed and toilet with standing height.. The twin helm seat gives support for the ultimate performance. Aft of this are seats that face a table, or fold over to form a triple sunlounger that leads onto the bathing platform. In the bow is seating for a further six people.

Ten engine options include petrol or diesel sterndrives, single or twin, with powers up to 600hp total and three electric options with powers of 200kW up to the mighty 460kW, designed by Rand's own technical team. Maximum speeds are 57mph with the 600hp petrol, and 54mph with the 460kW electric. A 234kWh Lithium battery pack gives a range of up to 186 miles crusing, or 25 miles at full power.

SPECIFICATION

Hull length 925 - 995 cm
Hull width 289 cm
Draft 53 cm
Maximum power 400kW
Weight ex. engine 3000 kg
Maximum crew 12 persons
Cost from €299.900

SUPREME 27

Spacious and comfortable like nothing else in the category, the Supreme 27 is a spectacle of fun and games at sea, with a multitude of entertainment options and seating areas, all wrapped up in the usable and functionalistic RAND Boats design. The overwhelming space aboard the Supreme 27 culminates at the aft sun lounge which provides a remarkable queen size threeman bed with perfect view of the horizon.

SPECIFICATION

Hull length 844 cm
Hull width 259 cm
Draft 35 cm
Maximum power 300kW
Weight ex. engine 1550 kg
Maximum crew 12 persons
Cost from €185.900