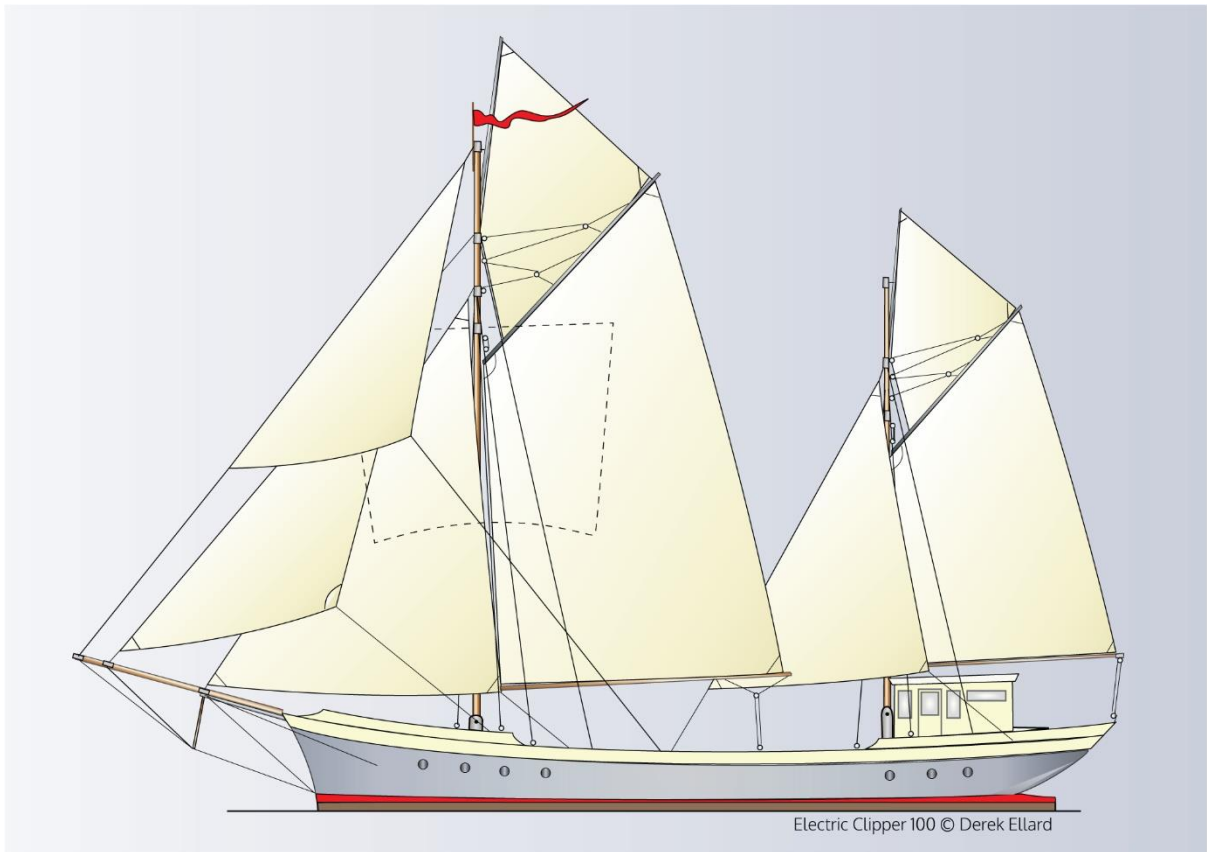




Go **SAIL** Cargo

SHIPPING SOLUTIONS



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PART 1

GO SAIL CARGO ZERO EMISSION SHIPPING

Introduction – before I began work on our new sailing cargo ships, I went back to basics and identified several key attributes I considered necessary for a successful wind powered ship.

- Any proposed vessels must aim for zero carbon operation and ultimately zero carbon build.
- They should dovetail seamlessly into existing freight handling systems.
- Any new ship must operate safely, competitively and profitably with the least possible disruption of the natural environment.
- They should have a long working life to ensure good returns on investment but enable future technological advances to be incorporated efficiently with minimal disruption to schedules.

Our proposed range of vessels will all fulfil the terms of our self-imposed criteria.

Our premise is simple. Use traditional small sailing ships, honed to near-perfection over the centuries, as a template for 21st century freighters. Examine, analyse, upgrade and improve every element of the vessels using the best technology available. Then, inspired by the astonishing US WW2 Liberty Ship program, set up global automotive style mass-production facilities to build them and exploit the economies of scale. I'm not just thinking of our own boats, there's room for us all.

In order to maximise the probability of getting such ships on the slipway, extensive research, consultation and creative thought over a period of four years is ongoing – only the best will do.

Go Sail Cargo's new zero carbon ships will incorporate a host of advances, among them low friction bearings, graphene supercapacitors, hull friction reduction devices, Scandium alloys, combined PV/hot water panels on the wheelhouse, Dorade powered air cooling and compact VAW generators on the channels plus solar on the awning, cargo hatch and covers. Weight aloft will be dramatically reduced, the sails will draw on racing experience and the instant torque of their electric engines will be there on demand, yet at first glance they wouldn't look out of place in a 19th century harbour.

Why? Chief among our reasons is the fact that passengers will be an essential ingredient in the operational spreadsheets. Yes the boats are working freighters, but to attract paying passengers some aesthetic elements of the romantic past should be retained without sacrificing speed and efficiency. Besides, a decent bowsprit is an essential selfie ingredient.

We're working on a portfolio of seven new vessels, some in KD kit format for smaller yards. One of our boats is production ready and two are getting close including:

- 2 new multi-purpose ship's boats
- A gaff yawl, the Secret Trader 40, with a lightweight container-sized "Bus" module for 25 passengers - inspired by the conditions of the US Jones Act
- 2 Electric Clippers for Island trading
- Several versions of a lugsail-rigged catamaran and finally -
- The Electric Clipper C – 180. A three-masted schooner in two versions with slots for 24 or 36 TEUs – 850 tonnes. Room for 12 guests in beautifully appointed cabin suites. Full width sheet

tracks and gaff vang set the sails just so, and downwind the studding sails sheeted out to windward help to power her up to 17 knots if you're game. There's a new ship's boat – flexible, fast and fit for purpose – a whaler for the 21st century. There's solar wherever it's feasible and canted dagger boards in Vesconite sleeves damp the roll and sharpen upwind performance. Pitch damping and anti-friction devices, stabilizers and a NACA shaped dovetail sectioned keel are also planned. With a crew of up to 12 she is a smart, versatile ship for feeder, short sea or ocean routes. Development continues but the foundations are sound and we are encouraged to progress to digitalisation and optimisation.

PART 2

SAIL TRADING – AN OVERVIEW

I first began to think seriously about sailing cargo ships in the 1960s as the last of the wonderfully efficient Thames Sailing Barges plied their lonely trade along the English coast and rivers and by the beginning of the Seventies, the final cargo under sail was carried by the recently restored Cambria. That a cargo of 100-150 tonnes could be safely transported by a 19th century sailing ship manned by a crew of two was, and is, a triumph of practicality.

Fast forward sixty years and with the real threat of human extinction, sail is a hot topic and the focus of a thousand marine architects with hundreds of specialised programs. The world needs them and their remarkable innovations but equally, society must reference the heritage of working sail and heed the priceless experience derived from the past. My own path recognises the lessons of history, incorporates the wonders of technology and combining the two, offers smaller zero-emission sailing cargo vessels that are not only risk-averse but can be mass-produced and slipway ready in the shortest possible time. Given the accepted need for immediate action and the need to integrate the ships into existing freight handling logistics, the building of such vessels is a logical step. Sailing advances are such that our rigs are half the weight of an equivalent Thames Barge and electric auxiliaries, build systems, batteries and solar voltaics will never stop improving. A good example is the French “Dualsun” panel

A lifelong respect for the often unpredictable power of the sea has led me to design ships that are strong, stable, reduce weight aloft and ensure that all sails can be manually controlled in the event of any emergency. This is simply good old-fashioned seamanship.

While huge cost-efficient container ships cannot possibly be rigged like a clipper or schooner, their smaller cousins can and should be, provided they take advantage of 21st century innovations. It will take a massive effort and playing around at the edges with “green diesel” is simply not enough, try buying a French or German diesel car in a couple of years’ time.

It is my firm belief that a well-found sailing ship with optimised hull and rig plus electric auxiliary is neither risky nor ambitious – we have the skills and technology for true zero carbon trading right now, all we need is the will and the investment.

The electric motor has one moving part, directly connected to the variable pitch propeller. What could be simpler? The battery storage should be sufficient to power the vessel as needed and will reflect the requirements of the proposed use. As an example, a spice trader on the Marseille/Madagascar route will need not only a good wardrobe of light weather canvas for the Tropics but battery banks sufficient to transit the Suez Canal at 6-7 knots for 14 hours plus a bit for eventualities. Bigger back-up generators might be sensible too. However, given good solar input, propeller regeneration and a set of compact vertical axis wind generators there should be no cause for range anxiety. Our calculations indicate that even with flat batteries, no wind and no generators, the solar array on our C-100 will power the ship at 4 knots. With the generators on the speed rises to 7knots. Further, the relentless progress of technology means that the likelihood of having to start the generators at all will recede with time.

While some may question the use of traditional rigs, ours are traditional in appearance but not in essence and certainly not in performance. Sailing and sail technology has made huge advances in the last century and we will use every opportunity to take advantage of the performance gains without losing the passenger attracting aesthetics of billowing sails in a brisk breeze. Paying passengers help

man the ship and balance the books too. The economics of reduced crew levels are addressed with powered handling systems and stronger, lighter gear but manual back-up is available because common sense and due respect for the ocean remains a priority. The storm will not ease while you fix an electronic glitch in the automated reefing system or try to restart your generator.

Once in port, cargo is king and getting it on and off efficiently is essential. The hatch covers with their solar panels are folded back. The aft dockside mast stays are quickly and easily unshackled and the furled sails swung aside to ensure the containers or bulk break cargo is accessible. For smaller ports the ships' own derricks can load up to 5 tonnes or the 8-pallet electric pontoon stored on deck for use in remote locations.

Of course that is only part of the story, behind the scenes is a hive of shipbuilding activity from the fitting of hyper-efficient pumps, using coolants to heat the bathwater and building with sustainable materials to name but a few. Then there's multiple disciplines of engineering, registry, compliance and insurance to consider. A long list but we're on to it!

Finally, while we wait for solutions to the problems associated with the world's giant container ships, let's get going with smaller, simpler risk-averse sailing cargo boats now, or nature will make the decision for us.

PART 3

ENERGY – POWER ON BOARD

NOTES ON ELECTRICITY GENERATION ABOARD GO SAIL CARGO SHIPS

The generation of electricity in sufficient quantities to power all the motors, pumps, lights, derricks, winches and assorted systems must be, wherever possible, pollution free, reliable and from a variety of sources. While our ships will have manual options for the sail handling systems, safety and reduced crew numbers, for whatever reason, necessitates efficient, reliable and easy to service power equipment.

As a result of ongoing research and development, we have increased the size of the battery banks and motors on our ships. Larger banks are an increasingly viable proposition as battery prices continue to fall and storage capacity rises. For ships operating in equatorial waters, good reserves of stored energy are vital as light winds are prevalent. The electricity generated on our Clipper range is from the following sources, and as an example, we use the Clipper 100.

- Propeller regeneration. Under sail the vessel's auxiliary electric motors become generators in much the same way that electric vehicles harvest energy under braking. The props spin as the water flows across the blades and when the batteries are charged up, the blades can be folded to reduce drag. There is a speed reduction as a consequence but we estimate that it will be marginal, particularly in higher winds. This of course a welcome bi-product and removes the need for separate hydro-generators. Useable voltage will depend on boat speed, propeller design and motor size. One good reason for the installation of larger motors is the higher recovery rate.
- Solar voltaic panels, fixed and removable. Fixed panels on the full width wheelhouse roof, for instance, will generate up to 4.5 Kilowatts, but a more realistic figure would be 3 during daylight hours. A percentage of the panels will be combination thermal/electric panels such as DualSun where the water in the thermal panel cools the voltaic panel above – increasing the efficiency and generating hot water simultaneously. The system could be expanded with small bore piping across the entire or at least a greater part of the roof.
- Removable solar panels will be fitted to the cargo hatch covers and the foredeck awning. Panels on the upper sections of the mainsail and on boat covers will be semi-permanent to allow for replacement. Advances such as the "Power Roll" film show great promise. Together on the C100 they could generate a reliable 8 Kw, for a total of 12 all up.
- Vertical Axis Wind Generators. (VAGs) All our vessels are fitted with steel "channels", horizontal panels at deck level either side of the ship. They perform a number of functions, including a stable base to mount VAGs. Power output is yet to be estimated but the innovative Alpha 311s seem to be just what we're looking for, powerful, compact and efficient.
- Plug in power. Rapid charging stations for boats and ships will become commonplace. If they are solar or wind powered, then it's a win for everyone and common sense prevails. Our engineers at Ampcontrol are working on compact solar/battery power units for remote locations.
- Human muscle power can be another power source, a traditional windlass with say, four people pushing could generate close to a Kilowatt, but persuading the participants could be an issue . . . another proposal is the installation of rowing machine generators, a more sensible approach for passengers to contribute and keep fit at the same time.
- Back up diesel generators. The fuel efficiency of the next generation will undoubtedly improve and the use of greener fuels will eventually become commonplace. The aim of our vessels is to

complete the voyage without recourse to the diesel generators, but inevitably, they will at times be needed, we have no choice but to be pragmatic - there's freight to be delivered.

- Further efficiency gains include: The use of water used for cooling electronics, batteries, auxiliary motors and generators to pre-heat the ship's hot water supply and for such things as sail/laundry drying racks and ducted heating. New generation fans, pumps and bearings, quieter, longer lasting and much more efficient will be installed, all helping to reduce the reliance on diesel generators.
- In summary, these are but a small part of the planned energy saving gains, where a series of incremental steps quickly add up to significant advances in efficiency, reliability and profitability. Sustainable, zero emission, accountant-friendly trading is here.

PART 4

SAILS – THE ENGINES ABOVE DECK

Just as the auxiliary diesel was once referred to as the iron topsail, the sails became the engines aloft. Just like any engine, they need to be designed and engineered with care to ensure optimum performance for the demands made of them are extreme. From balmy cruising in the tropics to clawing off a treacherous lee shore under storm canvas, these engines cannot miss a beat.

At Go Sail Cargo our route to reliable horsepower is evolution and our chosen rig is the gaff schooner or ketch. These sailplans have evolved over the centuries in the hands of fishermen, fighters and traders, all with a big stake in their performance and versatility. While the clippers running down the ocean's freeways, the tradewinds, set clouds of squaresails, they are not suited to our smaller boats as their job is to deliver the goods to the smaller ports and remote communities with a skipper and a few hands to trim the sheets.

In keeping with our commitment to practical low risk evolution, it is true that the profile of our traders would not look out of place moored alongside a 19th century quayside, however closer inspection will reveal dramatic improvements. Weight – it decimates performance, so we trim it away. Heel is reduced and more sail can be set – a bigger engine. As an example, the mainmast, sails and rigging of a 19th century Thames Sailing Barge weighs 4 to 5 tonnes, for an equivalent new C100 we're aiming to trim that to 25%. That translates into a faster ship, a safer ship and with an optimised hull, the evolution process starts to pay real dividends. But it doesn't end there, longevity and reliability are way better so it's good riddance to rotting hemp and disintegrating canvas. There's new alloys, carbon fibre, new generation synthetic ropes, low friction fairleads, powerful winches and I haven't got to the sails yet!

Our sailmaker of 25 years, Ben Kelly, is not only an expert in modern interpretations of traditional rigs, but now he's with North Sails he has access to the very best of modern technology. If anyone can power up a Gaff rigged cargo ketch it's Ben.

Using our new clipper 100 as an example, he's suggested 3 types of sails starting with the mainsail, the key driver, and the mizzen. These sails utilise advances pioneered in racing but adapted to working craft. They're laminated not sewn and built up over adjustable moulds to the desired profile. The 21st century sailmaker is rolling resin and slow cooking to create sails our forebears could only dream about – superlight, tough, perfectly foiled and with flexible solar panels glued on, complete with bonus power. In the event of damage new patches are applied with fast curing resins.

The second type in the wardrobe comprises the staysail, or inner jib and the jib itself, contemporary evolutions of working canvas, made from heavy duty synthetic cloth to withstand the rigours of trading under sail. The staysail is roller furled and shackled to the end of the inner steel bowsprit to simplify the sailplan and allow more room for the squaresail. The jib itself is similar and both foresails are strong, resilient, hold their shape well and shed water quickly. These two sails complete the 'working wardrobe.'

Third in our list are all the lighter, fair weather sails, genoas and topsails. Again, drawing on a vast reservoir of competition experience, these are full cut to power the ship in lighter conditions. Given that our traders will operate in the gentler latitudes, it would be a crime not to include an outrageous Yankee from bowsprit end to masthead. 150 square metres? That'll do, we'll take that 12 metre pole as well. Generous yard topsails will be bent on to lightweight alloy or, budget permitting, carbon fibre spars and sent aloft as soon as possible and taken in only reluctantly.

Now we come to a couple of sails that depart from our 19th century template, the first, the mizzen staysail, is hanked on to the mizzen derrick and set out to windward in clear air. If you're considering an ocean race [with or without cargo] then consider our "hammock" a square topped spinnaker with an offset yard set like a clipper's stunsail, sort of. Last but not least there's the squaresail, a downhill flyer to exploit the "lift" factor and provide inspiration for the owner's boardroom painting. This sail is bent on to its yard and pre-furled prior to hoisting. The spar attachment points are offset and a wire "track" shares the load and holds it steady when hoisting. Once up, the squaresail is unfurled and braced from the safety of the deck. This sail is a special case as it has to be light enough for two hands to set but strong enough for prolonged tradewind use. The squaresail, with a reefed main, staysail and perhaps a smaller mizzen staysail, could eat up the stress free sea miles.

Now you're probably wondering why all those sails? Versatility, balance and manual operation when all else fails – a sailplan for every occasion, force 2 up to force 7. Beyond that it's time for that tiny orange storm jib, faith in a good ship and a steady hand on the wheel.

These canvas engines then, produce more useable power to drive the Clipper 100 along at a fair clip, come what may, the cargo is safely delivered, there are no fuel bills and the ship's owners are content. A job well done.

PART 5

SHIPPING SOLUTIONS *for* PACIFIC ISLAND COMMUNITIES

Go Sail Cargo, headed by Derek Ellard, is committed to practical, zero emission shipping solutions. Solutions available off the shelf right now. Based on one simple premise, that sailing ships work, but work much better with added technologies.

While it is important, vital even, to continue research in all forms of zero carbon transport, Go Sail Cargo is committed to getting reliable super-efficient cargo ships on the water in months, not decades.

Climate change won't wait, so build a 19th century coastal trader in steel. Work up an easily driven hull, rig with modern cordage, carbon fibre spars and the best sailcloth, add hyper-efficient electric auxiliaries with solar charged batteries and you're on your way to a 21st century version. A new ship well able to compete with diesel with one huge advantage – it costs next to nothing to run.

Imagine a coastal trader that reduces fuel costs by 90%. We could have one working on the water within a year. Imagine a dozen of them, many built in the Pacific Island communities from kits. We can start the kit production process in six months. We have been manufacturing ply and timber kits for over thirty years.

Pacific decarbonising starts here, now. Consider our Clipper 100.

KEY ADVANTAGES

AVAILABILITY

The use of proven off-the-shelf commercial componentry and systems. The design and engineering is at an advanced stage. A leading shipyard is ready to go. This all adds up to immediate action.

AFFORDABILITY

A firm commitment from Go Sail Cargo to keep all build costs down to a sensible level without compromising quality or longevity, add ultra-low operational costs and the result is a financially attractive solution.

CAPABILITY

Practical, low risk, cost effective, fit for purpose workboats, designed for a long hard life by sailors and shipwrights with a vast reservoir of experience.

ADAPTABILITY

All our boats are easily customised to suit all operations. Their rigs – the power plants – are equally at home upwind or down, in a gentle breeze or with a trade wind filling the squaresails.

The holds can take four containers or ninety-eight pallets or a hundred tonnes of building materials. Over the hold sits an 8-pallet aluminium barge to get through those narrow channels to the shore.

Trading, tourism, ferrying, or research – you have it.

RELIABILITY

Reliability is surely a priority. With no unproven technologies on board, optional manual operation of all equipment, simple components which can be repaired or serviced worldwide, multiple back-up charging systems and a tough, stable hull, we are confident.

BUILDABILITY

The availability of our kit systems, developed over thirty years and adapted to steel hulls, plus a comprehensive builders' manual, mean that smaller shipyards throughout the region can build their own ships. Big cost advantages and investment in the community, for the community.

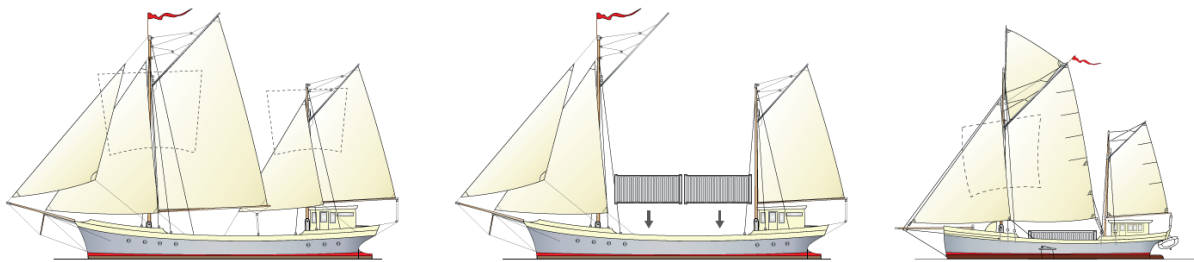
ACCOUNTABILITY

All governments strive to be accountable for their choices and the flow-on effects and the impact on those who inherit them – their children. Our maritime solutions, available now, are investments in their future.

FALLIBILITY

No ship will ever be perfect but the designer's job is to get close. Three years in development, the Go Sail Cargo Clippers combine the very best of the 19th and 21st centuries in a strong, stable, speedy ship.

The battery banks are charged by wind, solar and propeller regeneration, plus two back-up generators. In a flat calm the ship motors on – there's cargo to deliver, schedules to keep.



THE KITS

THE CLIPPER KITS

The Clipper 100 hull kit format comprises accurate pre-cut steel components, delivered ready to weld. All modular standard components from fit-out to engines, batteries, solar systems etc. would be delivered in stages as work progresses in the regional shipyard. The community saves money, local people are employed, and design variations are incorporated to suit community use – it becomes “their boat.”

READY TO SAIL

THE CLIPPER 180

The Clipper 180 is our largest sailing cargo boat to date.

THE E-CAT 46

A zero-emission, self-sufficient, solar-electric catamaran, developed for ferry, tourism, or research use. A cargo of eight tonnes or up to one hundred people. A solar array of 12kW plus generator and wind power means shore charging is eliminated completely.

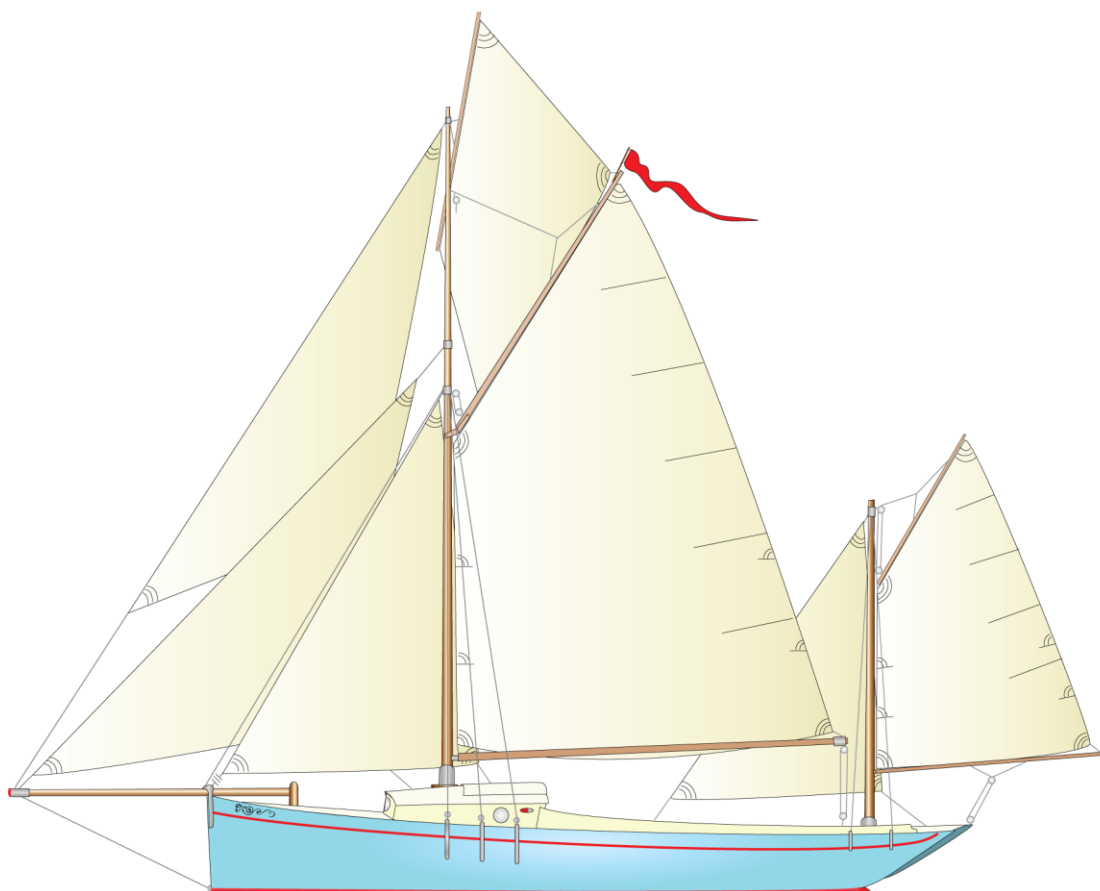
The GRP catamaran hulls are available now with an all-aluminium superstructure built to order. Build time is six months. There's a sailing version in the pipeline too.

THE SECRET 33

The Secret 33 sailing boat is a multi-purpose vessel, designed as a gaff or lugsail yawl for a crew of one or two. The fibreglass hull moulds were built for the alternative solar-electric versions, two of which operate as ferries on the Swan River in Perth, Australia. They are extremely efficient, requiring virtually no shore charging. <https://electricferry.com.au/>

While the Secret 33 would make an excellent inter-island sailing cargo ship or 12-passenger ferry, the boat would be equally at home in tourism operations or as a sail training vessel for young people to graduate to crewing the Clipper 100s.

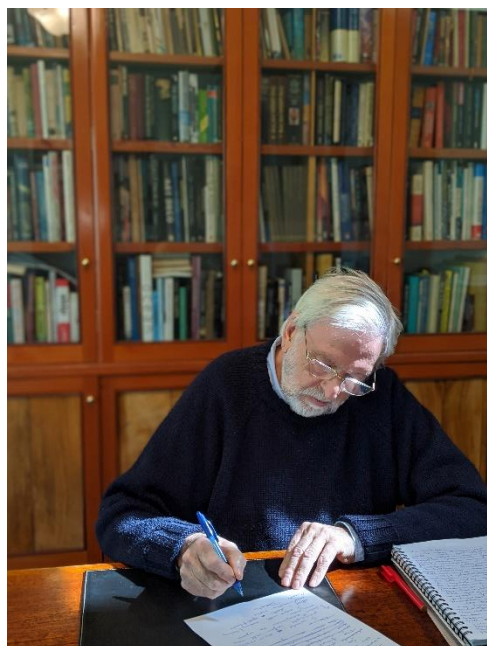
The Secret 33 hulls can be built in either version with the appropriate keel fitted during manufacture. Both versions have custom layouts, are available, and are shipped via a 40-foot flat-rack container.



THE DESIGNER

DEREK ELLARD

Derek Ellard is the designer and initiator of the concept.



Derek has spent most of his working life involved in boats and the sea. He has studied working sail since he was at art school, specialising in his native United Kingdom smacks, barges and traders. In 1991 he started Scruffie Marine with a simple theme – take the best of traditional rigs and efficient hullforms and combine them with modern technology. The same principles apply to his Clipper series of today.

Scruffie Marine went on to sell 340 boat kits and boats worldwide and earned many accolades, providing valuable and well-designed boats or projects for schools, outdoor education and private use.

He is one of the few people in the marine industry who actually builds the boats he designs.

Derek's Secret 33 ferries look like boats from the 1920s yet incorporate a wealth of 21st century features and remain a

perfect example of his vision.

A passionate environmentalist with a keen understanding of the practical aspects of the shipping business, a keen eye for aesthetics, Derek is dedicated to future focussed solutions.

A CALL TO ARMS

Slowly but surely the maritime world is waking up. Just as electric cars, buses and trucks were a rarity a decade or so ago, so electric and sail-electric shipping was a rarity, now it will be commonplace within ten years.

But is it enough? Well, no, much much more needs to be done, preferably yesterday. While our offerings are at the smaller end of the shipping scale and we certainly do not have all the answers, we do have boats and ships pretty much ready to compete on equal terms with fossil fuelled shipping. Except that we're not equal, we're better. We are deliberately not breaking new ground we are not cutting edge and certainly not revolutionary – those things tend to be risky and expensive, particularly if they don't live up to the hype of the day.

Our call is simple. We're practical people, not dreamers, and isolated communities need solid solutions. We hear them calling and we'll answer the call. We're ready to start.

Derek Ellard

CONTACT

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LINKS

Go Sail Cargo <https://gosailcargo.com/>

Scruffie Marine <https://scruffie.com/>

Electric Ferry (Secret 33) <https://electricferry.com.au/>

APPENDIX 1

PROOF OF CONCEPT

The tall ship Tecla is very close in size and rig to the Clipper 100 and she's still sailing the world after 105 years.





TECLA