

## RURAL ECONOMY AND CONNECTIVITY COMMITTEE

### INQUIRY INTO CONSTRUCTION AND PROCUREMENT OF FERRY VESSELS IN SCOTLAND

#### SUBMISSION BY PEDERSEN CONSULTING



#### BACKGROUND

This document forms written evidence from Pedersen Consulting to The Rural Economy and Connectivity Committee on its inquiry on the construction and procurement of ferry vessels in Scotland.

The remit of the inquiry has been stated as to identify and address current and future challenges and opportunities in the procurement of new vessels to support Scotland's ferries network and it is understood that this has been triggered by the very substantial cost overruns and delays in delivering vessels 801 (*Glen Sannox*) and 802 by Messrs Ferguson Marine Engineering Ltd.

In the Fergusson Marine report 'Updated Cost and Programme for Vessels 081 and 802' of 9 December 2019 a number of issues responsible for delays were noted including: lack of project management, planning and control systems, lack of integrated working, out-of-sequence activities and lack of useful management information. Other issues included weak engineering processes and confusion over specification causing significant redesign work. These are extremely serious shortcomings of management that have led to an increase in the cost of the ships from just under £50 each to over £100 million each and possibly more.

In its briefing the Committee has stated that during the inquiry it hopes among other matters to explore:

- The proposals and timetable for the completion of two new hybrid ferries
- The Scottish Government's proposed public ownership of Ferguson Marine Engineering Ltd;
- Potential implications of this activity for future procurement of vessels to meet the needs of the Clyde and Hebrides ferries network and in particular how might the experience of the procurement and fulfilment of the current hybrid ferries contract inform the development of an updated Ferries Plan?
- The potential implications of matters related to this particular procurement process for the ongoing development and updating of the Scottish Government's Ferries Plan and Vessel Replacement & Deployment Programme.

In addressing the above issues, Pedersen Consulting believes that it is necessary to take step back to consider a more fundamental issue – namely, the suitability or otherwise for their intended stations of the design specification of the (overly) complex vessels currently building and others of the Caledonian MacBrayne fleet.

### **DESIGN SPECIFICATION OF 801 AND 802**

Vessels 801 (*Glen Sannox*) and 802 have the following general characteristics:

Length of 102.4 metres x beam of 17 metres x draught of 3.4 metres

Deadweight 1,273 giving a payload of some 1,000 tonnes

Capacity for 1,000 passengers, 127 cars or 16 heavy good vehicles

Crew circa 34 living on board

Power 6,000kw

Propulsion 2 x controllable pitch propellers and 3 bow thrusters

Dual fuel diesel and LNG

Speed 14.5 knots

### **DEADWEIGHT**

Vessel 801 (*Glen Sannox*) is intended for the Ardrossan-Brodick (Arran) service, while Vessel 802 is intended for the services across the Little Minch alternately between Uig (Skye) and Tarbert (Harris) and between Uig and Lochmaddy (North Uist).

The heaviest load **ever** carried on any sailing are respectively 366 tonnes (Arran) and 466 tonnes (Uig) with the average loads being about half these figures.

The significant over specification of the two new vessels is further underlined in the that, apart from two other services – namely Stronoway (704 tonnes) and Islay (484) which have exceptional characteristics, the heaviest ever load on all other CalMac services is even less than that stated above for the Arran and Little Minch services. This means that the new vessels are grossly over-specified for all CalMac services in terms of deadweight.

**Question 1: Why then was it felt appropriate to design vessels with more than twice the deadweight required for services for which they were intended?**

### **PASSENGER CAPACITY**

Compared with industry norms, one of the odd and very costly characteristics of the CMAL/CalMac fleet is the very high ratio between passenger and car capacity of typically around 7.5:1 where between 3:1 and 4:1 is normal. Providing a significantly greater passenger capacity than necessary increases capital cost and has a negative impact on deadweight. As crewing is broadly proportional to passenger capacity, a high passenger to car ratio necessitates a large crew whose accommodation further increases capital costs and reduces deadweight. With three exceptions, analysis of carrying figures in August 2019 (the peak month) on the major routes shows that a passenger to car ratio in line with industry norms at 4:1 would more than meet demand. Thus CalMac vessels carry significantly larger crews, and therefore incur much heavier capital and operating costs than necessary.

In the small number of cases where on occasion unusually large foot passenger flows are expected, it would be normal practice in the industry, either to increase the number of sailings at peak times, or provide supplementary, often seasonal, high speed, passenger only vessels with three or four crew to handle these peaks. This is a much cheaper and for the passenger speedier and more convenient alternative to doubling up passenger accommodation of a vehicle ferry against the event of very occasional passenger peaks.

One route on which there are occasional heavy peaks of foot passengers is Ardrossan – Brodick. In an average year, on some 30 sailings out of a total of 4,500, passenger demand may exceed the 4:1 ratio (or 500 people). It is assumed that to meet this occasional demand, vessel 801 has been designed to carry 1,000 passengers which necessitates a permanent crew of 34, whereas other more cost-effective means as mentioned above could easily have been employed.

In contrast the maximum number of passengers ever carried on any sailing on the Little Minch routes is 312, less than one third the capacity of the new vessel proposed for these services.

**Question 2: Why was a passenger capacity of 1,000 specified for vessel 802 when the maximum ever carries on the route was less than one third of that?**

## CREWING

As alluded to above, the excessive passenger capacity of the new vessels will in each case require a crew of some 34 personnel to assist evacuation in the event of an emergency. Accommodating such a large crew on board together with the provision for 1,000 passengers, means that a high superstructure is a feature of 801 and 802. When coupled with their relatively shallow draught the resulting windage is likely to make these vessels difficult to manoeuvre in strong winds in particular with a ship of this size in Ardrossan's limited manoeuvring space with a tight turn into the terminal. This handicap is likely to lead to cancellation of sailings, a phenomenon of which the Arran community are already bitterly aware.

If vessel 802's passenger capacity were tailored to the demand requirement of the service a crew of say 12 or 14 would suffice to cater for this, which represents an annual saving of some £2 million per vessel. To illustrate the point, Pentland Ferries new 98 car, 420 passenger capacity ferry *Alfred* has a minimum crew requirement of 12, but operates with 14 in practice.

As almost all of CMAL/CalMac's larger open water (Europe Class B) vessels feature passenger capacities well in excess of the maxima they are ever required to accommodate, they are obliged to carry a larger crew complement than otherwise necessary. For most vessels/routes the biggest load on any sailing is around half the ship's passenger capacity. For Coll, Tiree and Barra it was under one third in 2019. It is not uncommon on these routes for the number of crew to exceed the number of passengers in winter.

That these large crew compliments live aboard the vessels means that a whole deck and sometimes more is devoted to their accommodation, an expensive feature that would not be necessary if crews were based ashore. Crew living on board has a further disadvantage in that, unless two crews are accommodated, the vessel's steaming hours per day are limited by working hours and rest period regulations, whereas shore based crews working in shifts, have the flexibility whereby vessels can work from early until late and round the clock if necessary, for example at times of peak travel.

Furthermore, if a vessel's home port were the island community served, then the live-ashore crews, their families and dependents would contribute to island life as described in more detail in Pedersen Consulting's submission to the Scottish Government, "Ferries and the Islands Plan" of October 2019. Ministers' objectives in taking the Islands Plan forward included "increasing population levels". Thus, island based crews with their families and dependents, on the basis described above, would add a total of some 1,200 persons to the populations of the islands involved. On Barra, for example, the effect would be a 10% population increase.

Pedersen Consulting's Ferries and the Islands Plan submission covers many other issues regarding optimising Scottish ferry services to the needs of island communities while getting better value for the public purse and should be referred to in connection with this submission.

**Question 3: why do CalMac accommodate overly large crew complements aboard their major vessels when shore-based crewing would contribute to Ministers' objectives in the Islands Plan?**

**ON BOARD CATERING**

Another wasteful feature of the major vessels in the CalMac fleet is generous on-board full restaurant provision and separate bars that are very costly to provide and often underutilised by the travelling public, particularly on short routes of less than one hour such as Ardrossan-Brodick. One example quoted by the Mull Ferry Committee is the MV *Isle of Mull*, on which no less than thirteen crew positions relate to such on-board services. The average annual cost of filling each of those positions is well in excess of £1 million, excluding the capital and overhead cost of accommodating those personnel on the vessel. It is understood that Vessels 801 and 802 will perpetuate such lavish catering facilities.

Apart from the high cost of CalMac providing such generous on-board services, they abstract from the income of local businesses, which flies in the face of the Islands Plan, two of whose objectives are improving and promoting sustainable economic development and community empowerment.

The norm on Norwegian ferries is a simple kiosk serving coffee and snacks, as is the case with Pentland Ferries MV *Alfred* with one member of the ship's complement (two at peak times) providing a simple range of fare from the servery.

**Question 4: Why provide lavish on-board catering facilities at public expense when this abstracts from the income of local businesses and is counter to the aims of the Islands Plan?**

**VESSEL UTILISATION**

The very title of the Rural Economy and Connectivity Committee suggests that good "connectivity" is central to its purpose. It is important, therefore, to consider the extent to which vessel 802 might contribute to the connectedness of Harris and the Uists to Skye and the Scottish mainland – the service to which the vessel is destined.

While the current connections between Uig and respectively Tarbert Harris and Lochmaddy North Uist are relatively short (under two hours), the schedules are infrequent, irregular and inconvenient because one vessel MV *Hebrides* (612 pax, 90 cars, 34 crew) operates alternately to serve Harris and North Uist, ending up at a

different port each night. This means that the schedule varies radically from one day to the next. Connectivity is thus constrained by the use of one large over-specified ship where two simpler more economical vessels could provide a regular, more flexible and frequent service of much greater capacity. A further impediment to connectivity is that like most Clyde and Hebrides ferry services, the Little Minch services cease operation in the early evening, constrained by crew working hour's regulations which further reduces useful travel opportunities.

Bearing in mind 802s relatively slow contracted speed, the best that this even more extravagantly specified vessel can do is to perpetuate the current inadequate schedule, which does not even enable Harris and Uist residents to visit the Scottish mainland and return the same day – a fundamental requirement. Because of 802s increased size compared with *Hebrides*, it will be necessary to rebuild terminals at a cost of perhaps £30 million or more.

When vessels 801 and 802 were in early conception by CMAL, the question was asked at the then Expert Ferry Group, “what was the maximum number of passengers carried on any Little Minch service?” No answer was forthcoming. Nevertheless, the point was made that for the Little Minch services, two simpler vessels (say 80 cars and 250 pax) with a crew of say 12-14, each separately dedicated to Tarbert, Harris and Lochmaddy, North Uist, would allow a regular more frequent timetable and thereby revolutionise connectivity, encourage traffic growth and contribute to the development of the island economies (as subsequently sought under the Islands Plan). Help was offered in taking this concept forward, but the offer was ignored.

Under a commission from HITRANS, Pedersen Consulting undertook a study of the concept, “Little Minch Ferry Options” July 1017, which concluded that the two ship operation would be cheaper than single vessel 802 (at a time when build cost of the latter was still assumed as £47.5 million), it would generate more revenue and require significantly less subvention of public funds to support the operation.

**Question 5: Why was a single over-specified vessel designated for the Little Minch services when a two ship solution would be better and cheaper?**

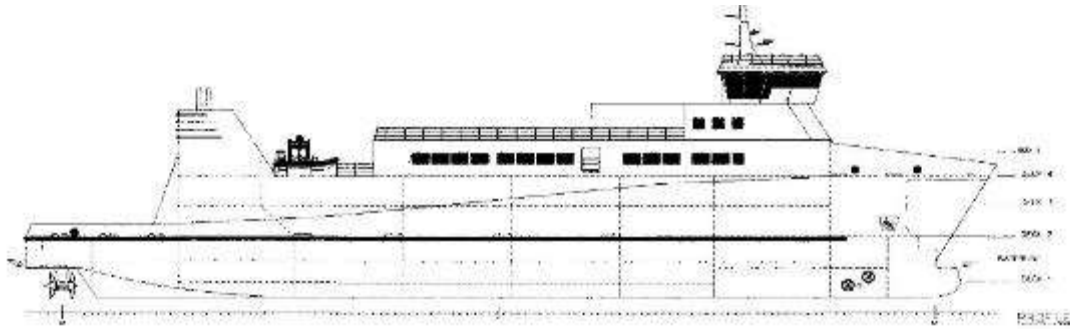
### **ALTERNATIVE VESSEL SPECIFICATIONS**

In considering the specification for two vessels to serve the requirement for the Little Minch services, it is useful to refer to the example of two available designs.

#### **Example A: Monohull**

A decade ago Western Ferries commissioned the design of initially two ferries to provide a commercial operation serving Arran. The design was taken to an advanced stage to just short of cutting steel, but the project was shelved due to the introduction of RET. The general characteristics of these vessels were:

Length overall 80 metres x beam overall 14.9 metres x draught 3 metres  
Deadweight 550 tonnes  
Capacity 450 passengers max, 300 winter, 80 cars or 10 heavy goods vehicles  
Crew 10  
Speed, 12 knots, service, 15 knots maximum.  
Build cost: Europe £22-25 million, Far East £15 million



***Western Ferries 80 car monohull design***

A general arrangement deck plan of this design is provided at Appendix 1. It will be observed that passenger accommodation is provided on one enclosed deck and an open sun deck. Overnight crew accommodation is provided forward of the sun deck for use mainly on positioning voyages, emergencies or other exceptional circumstances. Crew would normally live ashore.

The quoted cost by a foreign yard of these ships at the time was £10 million each. This equates to around £15 million at current values or perhaps £25 million if built in an efficient UK yard.

### **Example B: Medium Speed Catamaran**

Sea transport Solutions of Queensland, Australia was commissioned by Pentland Ferries to design and arrange the building of MV *Pentalina* at Cebu in the Philippines. *Pentalina* is a catamaran with the following characteristics:

Length 70 metres x beam 20 metres x draught 2.2 metres  
Deadweight 360 tonnes  
Power 3,876 kw  
Capacity 350 passengers, 58 cars or 9 trailers plus c 30 cars  
Crew 10-12  
Speed 15 knots (service) 19.7 knots (max)  
Original cost £7 million (circa £12 million at current prices)

MV *Pentalina* has proven to be a reliable vessel popular with the travelling public and with hauliers, such that, without a penny of government funding, she has attracted the majority of passengers, cars and goods vehicles to the one hour crossing of the notoriously challenging Pentland Firth between St Margaret's Hope Orkney and Gills



Bay, Caithness in the face of heavily subsidised competition from NorthLink's Stromness-Scrabster service. It is also worth noting that her CO2 emissions are less than half those per hour (one third per crossing) as compared with NorthLink's MV *Hamnavoe*.

As MV *Pentalina* has been running at capacity in recent summers, she has now been superseded on the route by the larger £14.5 million catamaran 98 car/420 pax, 12-14 crew MV *Alfred*. At 3,000 kw power, *Alfred* is even more economical and environmentally friendly than *Pentalina*. but can still achieve 16 knots. She has sufficient deadweight to carry 12 laden trailers plus some 35 cars.

***Pentland Ferries MV Alfred. Note low profile.***

Sea Transport Solutions have offered medium speed catamaran designs of appropriate size circa 80 cars, 440 tonnes deadweight for Clyde and Hebridean services that could be part assembled for series production in FMEL for an estimated £20-22 million apiece. If built in the Far East, the unit cost would fall to some £13.5 million. To date CMAL have shown no interest in such a concept.

**Question 5: What is the most cost effective and reliable two ship design for the Little Minch and for several other Clyde and Hebrides services?**

### **MONOHULLS OR CATAMARANS?**

There has been an ongoing debate among interested parties in Scotland as to the relative merits of catamarans versus monohulls. Some two years ago CMAL were offered for immediate delivery a new off-the-shelf catamaran for £14 million to serve Ardrossan-Brodick. This was turned down on grounds of inadequate deadweight, inability to berth at existing terminals and assumed poor sea keeping. Each of these reasons were erroneous. The

deadweight was quite adequate for the anticipated traffic, the ship's bow and stern ramps could have readily been adapted to interface with existing linkspans and the sea keeping qualities of medium speed catamarans are well proven by the performance of Pentland Ferries' *Pentalina* and *Alfred*. The deadweight concern



may have been affected by a presentation, 'Arran Terminal and Vessel Upgrades', made at Brodick in December 2012 by CMAL in which a 74 metre 80 car Sea Transport catamaran design was quoted as having a deadweight of 200 tonnes thereby limiting the number of heavy goods vehicles the vessel could carry. The correct figure for the design is 440 tonnes, which would have been more than sufficient to meet anticipated demand.



Practical examples demonstrating that each of CMALs grounds for refusal was misjudged are:

- *Pentalina* regularly carries nine fully laden trailers plus cars; *Alfred* 12 trailers.
- *Pentalina* and *Alfred* berth at terminals that were designed to serve two former CalMac vessels
- These vessels commonly sail when NorthLink's parallel running *Hamnavoe* does not. This was exemplified on 13 January 2020, when all CalMac services and *Hamnavoe* were suspended due to storm conditions, *Alfred* continued to sail, as did Western Ferries.

The reasons for the catamaran's superior performance and cost effectiveness is that, length for length, compared with a monohull, it offers a larger vehicle deck area above and between the hulls, the hulls have a much lower block co-efficient (i.e. are more streamlined) and have no requirement for water ballast, thereby requiring about half the power and fuel to push the hulls through the water and, therefore, emitting half the CO<sub>2</sub> of a monohull of equivalent capacity. The four engine, quadruple screw configuration provides much greater torque for manoeuvring than is possible with a monohull and ensures built in redundancy in the event of engine breakdown as the vessel can operate satisfactorily on three or even two engines. Such medium speed catamarans have proven sea-keeping capability and reliability and can readily be adapted to fit existing terminals. A further advantage of the catamaran is that their low-profile superstructure compared with the high sided 801 and 802 reduces windage, which facilitates berthing manoeuvrability in adverse weather conditions. A further positive characteristic of catamarans is that, they can expect a long operational life as they are not affected by corrosive water ballast and they tend to retain their resale value as distinct from the generality of CalMac vessels, which because of their inefficient designs, are virtually unsalable on the open market except for knock-down prices.

**Question 6: Why does the Scottish Government's agencies refuse to consider cost effective and environmentally superior catamarans for Clyde and Hebrides operation?**

### **FUEL AND PROPULSION**

Vessels 801 and 802 have been designed to be fuelled by both conventional diesel and LNG (liquefied natural gas). LNG has a slight edge in environmental terms in that it is a cleaner fuel than diesel, but it still produces CO<sub>2</sub> when burned. One disadvantage as regards the Little Minch services, is that it is understood that LNG would have to be road hauled from Kent to Uig by truck, a round trip of over 1,000 miles, which is likely to offset any environmental benefit from burning LNG on the vessel. Of more practical concern is the complexity and expense of installing and maintaining the dual fuel capability.

A more cost effective and environmentally beneficial approach would be to pursue solutions that require lower power per unit carried using conventional clean diesel technology, e.g. by employing medium speed catamarans where feasible, until conversion to clean hydrogen when that technology comes on-stream. It is noteworthy that the much-vaunted small hybrid ferries built for CMAL (part battery and part diesel electric) emit twice the CO2 per vehicle space and have inferior deadweight due to the weight of batteries compared with Western Ferries efficient conventional diesel ferries. This is all the more telling when the Western Ferries vessels cost one third of the build price of the CMAL hybrids and have almost twice the carrying capacity.

**Question 6: Why pursue an expensive and complex hybrid dual fuel policy when greater environmental and cost benefits can be gained by efficient conventional technologies?**

**FLEET IMPLICATIONS**

The Committee has stated that it seeks identify and address current and future challenges and opportunities in the procurement of new vessels to support Scotland’s ferries network and to explore how the experience of the procurement and fulfilment of the current hybrid ferries contract might inform the development of an updated Ferries Plan?

As has been demonstrated above, vessels 801 and 802 have raised many issues regarding their suitability for service on **any** Clyde and Hebrides service, particularly in terms of over-specified deadweight and in the case of 802 grossly over-specified passenger capacity necessitating a much larger crew than would otherwise be necessary. This coupled with dual fuel capability has resulted in extremely high capital and operating cost and the need for extensive and expensive terminal reconstruction, even before taking account of mismanagement of the build contract. The twenty-year cost (capital, fuel, crewing, insurance, maintenance, etc.) for each vessel (excluding terminal reconstruction costs as required for 801 and 802) is estimated in the following table.

*Twenty Year Costs of 801 and 802 Compared with a Medium Speed Catamaran*

	<i>801/802 each £k</i>	<i>Catamaran £k</i>
Capital cost (UK Yard)	110,000	22,000
Fuel	22,000	12,000
Crew	68,000	28,000
Other	12,000	7,000
<b>TOTALS</b>	<b>212,000</b>	<b>69,000</b>

It will be noted that at some £212 million each for vessels 801 and 802 or three times the £69 million twenty-year cost estimated for example B of vessels outlined under 'Alternative Vessel Specifications' above. The comparison would not be greatly different for example A. While these figures would benefit from refinement, there is no doubt that the cost difference between 801/802 and the kinds of alternatives that would actually provide greater capacity and better connectivity is very significant. This differential goes a long way to explaining why Pentland Ferries operates an efficient, popular and profitable services while CalMac designed NorthLink's parallel service requires a subsidy of an estimated £10 million per year.

As described in Pedersen Consulting's report 'West Coast Ferries – Shaping Change', August 2016, such cost-effective vessels as outlined above, or variants thereof, with more car space in proportion to passengers and smaller live-ashore crew complements, would be eminently suitable for a range of Clyde and Hebrides services. Employment of such vessels should be coupled with enhancing and re-organising routes in terms of frequency and capacity, especially where it is practicable to select shorter crossings and use intermediate islands as land-bridges. Where feasible, vessels should be based at the island communities they serve where locally recruited and resident crews would aid population retention and contribute to community social and economic life. In these ways the cost of Government support for Clyde and Hebrides ferry services can be reduced by an estimated £100 million per year, while service levels and revenue can be significantly improved. Such annual cost savings would go some way to relieving Scotland's cash and personnel strapped health and education services.

Such an approach is standard in Norway where ferries are regarded as part of the road system and where operating hours are extended by crews working in shifts. Vessels operate to "lock-on" linkspans which require no shore-side personnel and minimal on-board personnel to operate. Lock-on linkspans are already standard practice on Shetland Islands Council services, Orkney inter-island services and by Western Ferries. In a number of cases frequency of crossing and capacity can be enhanced while costs and environmental impact can be reduced through shorter crossings and improved road and land transport connections.

In summary, the basis of a long-term plan for creating more cost-effective ferries plying in Scotland's West Highlands and Islands has been set out in 'West Coast Ferries – Shaping Change'. By applying the recommended principles and techniques, in terms of operational methods, vessel and terminal design and crewing, more economical and frequent services will generate traffic, aid the social and economic development of the communities served while reducing costs.

As regards 802 and the Little Minch services, completion of the ship is estimated to cost an additional £45.9 million plus say £15 million for a share of consumables, overheads, etc. giving a total of around £60 million. To this should be added say £30

million for terminal upgrades bringing the total to an eye watering £100 million. Bearing in mind that 802 is unsuited to the Little Minch service or to virtually any other Clyde and Hebrides service, not least in terms of operating costs, it would clearly be much cheaper to scrap the vessel and build two more appropriate ships, which could act as models for future fleet replacement. Scrapping 802 will no doubt be an embarrassment for ministers, but better to cut losses now than to land the Scottish Government with greater on-going costs in future.

A future for 801, *Glen Sannox* is more debatable. Scraping may well be the most cost-effective option and starting again with a two simpler vehicle ferry plus seasonal fast passenger vessel. On the other hand, compared with 802, 801 is somewhat nearer completion with an estimated outstanding cost of £32.8 million to which may be added say £15 million for a share of consumables, overheads, etc., giving a total of around £48 million. Windage due to her high superstructure, as already explained, make her susceptible to weather cancelation at Ardrossan. The new £30 million terminal at Brodick is also problematic for high sided vessels to lie against in certain adverse wind conditions. For these and other reasons 802 is not an ideal solution for the Arran service, although her passenger capacity is a closer match to anticipated occasional traffic peaks. On balance, it may be worth continuing with completion of that vessel. For trial on the Arran run, but with the option of utilising her to replace ageing and fuel hungry *Hamnavoe* on the Stromness-Scrabster route where an LNG supply is readily available.

***Recommendation: Scrap both vessels or complete the build of vessel 801 for eventual employment on the Stromness-Scrabster service, but scrap 802 and plan construction of two simpler vessels for the Little Minch services***

## **FERGUSON FUTURES**

In considering the future of Ferguson Marine Engineering Ltd. (FMEL), in so far as the company may have a viable future at all, a radical change in the management will be required. To put it in frank terms, the company will have to be led by a team that knows what it is doing and that embraces best international practices of management, labour relations and cost-effective ship design and construction techniques. Employee morale and, consequently, productivity is currently low. Sound management and a viable path for securing future contracts are the only means of restoring morale and a commercial future. Public sector recruitment procedures, as currently arranged, are not necessarily ideal means of finding and hiring the best management for turning round what in Fergusons is a business in serious trouble. Finding an inspirational and capable CEO who might be prepared to take on the job, will be a tall order. Nevertheless, that is what needs to be done.

FMEL is the only significant merchant ship-builder in Scotland today. However, the yard is currently solely dependent on contracts from the Scottish Government for ferries and has been unable to secure international contracts.



**In the opinion of Pedersen Consulting**, this is largely because FMEL does not offer innovative or competitive ship designs at build costs necessary to compete in international markets. This failing is demonstrated by the high cost of small hybrid ferries delivered to CMAL and especially vessels 801 and 802. The company's strategy to fabricate and build complete vessels in Port Glasgow is quite at odds with the normal international approach. European yards nowadays mostly have the basic ship hulls built in low-cost yards elsewhere and then float them to their yards in Western Europe for final fitting out.

Clearly radical solutions are required. Options include FMEL forming strategic alliances with internationally successful ship designers and ship hull suppliers. Such a strategy was proposed by leading expat international designer and shipbuilder Stuart Ballantyne of Sea Transport Corp., a key element of which was to import low-cost ferry 'kits' from Asia for final assembly in Scotland coupled with developing the right infrastructure at the right locations. The requirements for many new ferries in Scotland (possibly as many as 100 valued at £2 billion or more (not just for CalMac) will be required over the next 15-20 years) could be used as a lever to help Scotland develop new global shipbuilding competitiveness, based on an important niche and smartly produced product in high demand. As a Scottish state or part state-owned shipyard, FMEL's option could be pursued, in partnership with private actors providing the required skills in design and production, with the aim of building most of Scotland's new ferries in Scotland based on imports of low-cost kits from Asia.

Thus, in summary, adoption of simpler vessel designs for the future with assembly split between Asia and Scotland, coupled with scrapping of one or both vessels 801 and 802 could be a viable way forward for a more efficiently managed FEML, the Scottish ferry fleet, our island communities.

### ***Sea Transport 80 car vessel design for series production***

***Recommendation: Radically restructure the management of FMEL and seek a joint venture with an experienced designer and co-ordinator of building much more cost-effective vessels partly in the Far East and partly in Scotland.***



## CONCLUSION

In addressing the yard's management failures, very substantial cost overruns and delays in delivering vessels 801 (*Glen Sannox*) and 802 by Messrs Ferguson Marine Engineering Ltd. (FEMLE), it is necessary to take step back to consider a more fundamental issue – namely, the suitability or otherwise of the design specification of these (overly) complex vessels.

Compared with industry norms, major vessels of the existing and ageing CMAL/Caledonian MacBrayne (CalMac) fleet have an unusually high and costly ratio of passenger to car capacity. In most cases, this costly over provision of high passenger capacity is **never** utilised. As crewing is broadly proportional to passenger capacity, large crew compliments with on-board accommodation further increases capital costs. With few exceptions, analysis of the carrying figures in August 2019 (the peak month) on CalMac's major routes shows that passenger capacity of half that currently provided would more than meet demand. Thus CalMac vessels incur much heavier capital and operating costs than necessary, which largely accounts for the excessive subventions from the public purse of supporting CalMac's services, for a relatively indifferent service.

Rather than improving the productivity of the CalMac fleet, the design of the vessels 801 (*Glen Sannox*) and 802, actually take these shortcomings to a new level. They are grossly over-specified in terms of deadweight (payload), passenger capacity and crewing levels, generally by a factor of two or more. These vessels high superstructure is likely to render sailings undertaken by them susceptible to weather disruption due to windage.

802, with passenger capacity of 1,000 for example, is destined for the Little Minch service where the maximum number of passengers ever carried on any sailing is 312. Yet employment of this vessel will do nothing to improve the infrequent, irregular service. Study demonstrates that a two-ship operation (using simpler vessels with less crew) would be cheaper than single vessel 802 and would offer a more frequent and regular schedule, generate more revenue and require less subvention of public funds.

As regards fleet development, if vessels of the 801 and 802 class were rolled out on other services, together with the need to upgrade terminal facilities, the cost of annual state subvention would increase, adding possibly a further £100 million or more to current annual funding levels, while offering no tangible service improvement. If on the other hand the principle of simpler vessels manned by crews living ashore in the communities served were to be extended to most of CalMac's open water routes, island populations would increase, service frequencies would improve, and cost would fall, perhaps by as much as £100 million, so releasing some £200 million funds annually to support our financially stretched health and education services.



In considering the future of Ferguson Marine Engineering Ltd. (FMEL), a radical change in the management will be required. The company will have to be led by a competent team that embraces best international practices of management, labour relations and cost-effective ship design and construction. Clearly radical solutions are required. Options include FMEL forming strategic alliances with internationally successful ship designers and hull suppliers. A key element would be to import low-cost ferry 'kits' from Asia for final assembly in Scotland. Many new ferries in Scotland (possibly as many as 100 valued at £2 billion or more (not just for CalMac) will be required over the next 15-20 years), which opportunity could be used as a lever to help Scotland develop new global shipbuilding competitiveness,

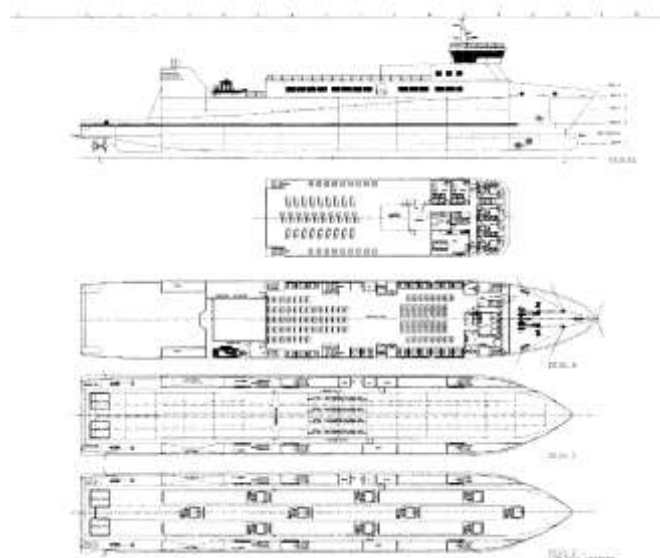
Adoption of simpler vessel designs for the future with assembly split between Asia and Scotland, coupled with scrapping of one or both vessels 801 and 802 would be the best way forward for FEML, the Scottish ferry fleet, our island communities and the nation as a whole.

Mistakes have been made, and a good deal of public money has been sunk in a misconceived and badly managed project, but in such circumstances, the solution is to learn from the mistakes made, know when to cut losses and pursue a more productive path in the future. That is what this submission recommends.

Roy Pedersen  
Pedersen Consulting  
20 January 2020

## APPENDIX 1

### WESTERN FERRIES 80 CAR MONOHULL DESIGN GENERAL ARRANGEMENT



Note: power-plants are located well aft to facilitate rapid access and replacement in the event of failure or routine maintenance, thereby reducing disruption to service...

## **APPENDIX 2**

### **SELECTED REFERENCES**

Baird, Dr. A J & R Pedersen, Analysis of CO2 emissions for island ferry services, Journal of Transport Geography, 2013

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