Marine Atlantic
Strategic Fleet Model

Document : 10264900-1
Date : 02 February 2005
Revision : 3

FLEETWAY

Customer Focused Solutions

Introduction

By Marine Atlantic

A MANAGEMENT STRATEGY FOR THE RECONFIGURATION OF THE MARINE ATLANTIC INC. FLEET

- **Where Are We Now?**
- **Where Are We Going?**
- **How Do We Plan To Get There?**

Where are we now?

To get to where we are today requires that we understand Marine Atlantic's recent history. Following a provincial government study "On Deck and Below" in the late 1990's, the Company began focusing on stakeholder needs and fleet capacity. In the past, the fleet of 3 vessels (*Smallwood, Caribou and Atlantic Freighter*) was barely coping with peak demand. Stakeholders were complaining that the Gulf ferry operation was inadequate both in terms of vessel capacity and corporate service culture.

In 2000, the *Leif Ericson* was purchased to fill the capacity gap. Although the vessel has proven its worth during the summer and shoulder seasons, it is not best suited for service in the winter. However, bearing in mind the pressure that the Company was under to respond quickly, it was the best vessel available at that time.

Within the past 5 years, Marine Atlantic's operations management team has changed either through attrition or by senior management desire. This change has brought new blood into the operation; which brings new ideas from experiences gained working elsewhere. Management has adopted a "best qualified" attitude when pursuing candidates for senior positions where, in the past, seniority became the ruling factor. All of the positions below have been filled from outside the Company, except for the Terminal Manager in PAB and the two Masters.

- Marine Superintendent
- Technical Manager
- Technical Superintendent
- Safety Officer
- Assistant to the Hospitality Manager
- General Manager
- Terminal Manger NS
- Terminal Manager PAB
- Four new Chief Engineers
- Two new Masters (expect to replace three or four Masters in 2005)

As in the 1990's we are fast approaching a similar situation, i.e. demand is fast catching up with capacity. Early in 2004, senior management approached this capacity problem by looking at what options were available. As can be seen from what is presented below, senior management were of an opinion similar to that of the Advisory Committee before the model was presented on Jan 14th, that is, mid-life refit the Superferries, replace the *Atlantic Freighter* with the *Leif Ericson*, and charter or purchase a vessel to replace the *Leif Ericson*.

Management's first conclusion was the *Atlantic Freighter* is at the end of her days with Marine Atlantic. Not only is the vessel old, the stern-only loading does not lend itself to an efficient operation. During the summer peak traffic demand, the *Atlantic Freighter* is the backbone of the Company's drop trailer service to the trucking industry. The question posed was how do we replace this very important asset? The consensus was that the *Leif Ericson* could be used to carry the drop trailer traffic as well as more than the twelve units of rolling traffic to which the *Atlantic Freighter* is limited. In fact, the *Leif Ericson* was designed with trucks in mind for the European route she once served. The vessel is versatile in that she can also carry approximately 450 passengers and can, on occasion, stand in for the *Caribou* and *Smallwood*.

The *Caribou* and *Smallwood* are aging. Due to equipment failures and the lack of parts for some of the systems, they are becoming unreliable and expensive to maintain. These Superferries have, however, served well over the years. Thus, consideration was given to extending their life by implementing a mid-life refit program. To this end, an RFP was raised to determine the feasibility of such a program. The engineering consulting firm, Fleetway, a company that has the expertise to provide conclusive answers through vessel inspections and the examination of current regulations, won the mid-life feasibility contract.

At this point in the proceedings, the inspections are complete; however, the writing of the specification is yet to begin. This has purposely been delayed until all options have been considered. Although a detailed specification is required in order to conclude what the cost of these refits would be, information provided by Fleetway so far allows some degree of Rough Order of Magnitude (ROM) estimate. This ROM is presently tagged at $80M for each vessel. In addition to this the shipping industry standard for vessels entering a repair/refit facility is contracts generally increase by 30%.

The options for replacing the *Leif Ericson* are: charter for the summer peak demand months or purchase a vessel. In light of this, Senior Management decided to provide the Company's Board of Directors with several fleet reconfiguration options. The options that were being considered by mid-2004 are the same as those included in the Company's 2005-2009 Corporate Plan. They are:

1. Status quo and charter - Operate the existing fleet along with a chartered HSC or conventional ferry in the high season.
2. Status quo and purchase - Operate the existing fleet and purchase an additional vessel.
3. Purchase larger faster freight vessel and sell *Atlantic Freighter*.
4. Charter a larger faster freight vessel and sell the *Atlantic Freighter*.
5. Purchase a larger faster passenger vessel and sell *Atlantic Freighter* and *Leif Ericson*.
6. Replace the *Caribou* and *Smallwood* with larger faster vessels and operate them along with the *Leif Ericson*.

While trying to cover off all eventualities management has sought a tool that would take into account all of the parameters for their long term planning. After discussions and a demonstration of such a tool, a model proposed by Fleetway, a contract was agreed.

The first model presentation by Fleetway included a new option, option X, which became option (7): Replace the fleet. This appeared by far the best option at that time. We discovered, however, that a cost driven model was more appropriate. Revenue driven models may be the correct way forward for a private operator looking at profit, but for Marine Atlantic a cost driven model is required. As it happened, after reviewing the cost driven model, the outcome remained unchanged; option (7) was still the preferred option.

Where are we going?
Management at Marine Atlantic will be presenting a recommendation to the Board of Directors that we adopt option ……… and that we move ahead to the development stage of the process. In order to maintain a comparison, however, we will also propose that we further develop option(s)………..

How do we get there?
The intention is to use a tactical model, into which detailed information will be fed. This model will include design parameters using proven vessel designs as well as the speed of the vessels, crew configurations*,* fuel and details of the sailing schedule. The differing traffic patterns i.e. the two commercial requirements; drop trailer and tractor trailer traffic, as well as passenger traffic, restricted and double restricted traffic, will have to be considered. The configuration of the dock and terminal facilities at North Sydney, Port aux Basques and Argentia would also be included.

The point of the exercise is to provide a "best fit" solution. Once this is achieved, suitable shipyards would be invited to provide proposals that meet this objective.

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Introduction

The strategic model results presented are intended to explore various fleet renewal options that have one or more characteristics deemed desirable by different parts of Marine Atlantic. The data returned by the strategic model is general in nature and is intended to be used to assess the relative merit of various far-reaching decisions rather than to predict accurately what MAI's cash flow will be at some future date. The assessment of relative merit is made possible by using identical values for inflation, fuel prices, insurance, fares, etc. for each option. In this way, the relative differences between options can be maintained at or less than ±10% while any absolute annual value may vary by ±30% or more.

Fleet modeling and simulations intend to assist Marine Atlantic in their efforts to determine the future fleet configuration that is best able to meet :

1. The Traffic offering as forecasted by the Regression Data provided by MAI
2. The schedule similar to the 2005 schedule provided by MAI that will meet the traffic offering.
3. That will take into account the Argentia service (Mid June to end September)
4. That will take into account the summer service (Mid June – end September), the shoulder season service (October – November & April - May) and the winter service (Dec – March).

The strategic modeling completed is :

- ideally suited to answer item 1, and;
- capable of addressing items 2,3 and 4 in a general sense.

The tactical or time domain model described later in this report is ideally suited to address items 2, 3 & 4 and can supply concrete data that can be used in place of various assumptions made within the strategic model such as : "*any terminal will be available whenever it is required*".

The Strategic Fleet Model is an analytical tool used to develop relative comparisons of various fleet configuration scenarios (options). Each option is defined within the model and the model recalculates revenue and expenses based on the relationships between the parameters entered. The calculated data is presented in a financial summary for each option, for each ship for each year for each route (NS-PAB & NS-ARG) and each season (summer/winter). To further evaluate the relative merits of each scenario, a scoring system is used to evaluate the data.

Background

Marine Atlantic Inc. is a Federal Crown Corporation and as such comes under political and public scrutiny. This has been taken into consideration in the options presented in this report.

Other important factors that must be considered are the essentiality of the service, and the environment in which the fleet has to operate.

Replacement vessel requirements for the busy summer season, makes a multi-year seasonal charter an attractive option. In the short term a multi-year 4-month charter will be of sufficient duration each year to cover the summer season requirements. This option results in winter lay-up costs and lay-up facilities for the vessel being avoided. Summer is the period of greatest demand for passenger ferries in both North America and Europe so a multi-year seasonal summer charter will be difficult to secure from European operators. In addition, it is anticipated such a short-term charter arrangement would be expensive to secure.

Since its introduction in 1998, experience has shown that effective load management and cost efficiency can be achieved through utilization of management discretionary sailing. Of the 33 weekly trips on the Port aux Basques service, 6 of these are management discretion. This will provide for capacity growth if the traffic offering demands it. However, to reach maximum capacity at present, all four vessels have to be in operation and meet a weekly schedule of 33 departures from Port aux Basques, 36 departures from North Sydney and 3 departures from Argentia. This maximum schedule will result in arrival/departure conflicts if any vessel does not meet its crossing and loading schedule. These conflicts emanate from (a) weather or mechanical issues exacerbated by the age of the fleet; (b) only one functional dock in Port aux Basques; (c) the stern loading Atlantic Freighter requiring more port time to load/unload; and (d) the speed of the existing assets, most notably the Atlantic Freighter (maximum speed is 17 knots).

To ensure MAI is able to maximize the schedule to provide the necessary capacity and the level of service demanded in an efficient manner, there will be a requirement to address these issues. A major factor in preparing the current operating schedule is the interaction between the passenger vessels and the Atlantic Freighter. The 3 to 4 hour load/unload time for the Freighter in each port, each day pressures the remainder of the fleet to be extremely efficient in their operating cycles to ensure the schedule is met. The commercial customers have advised MAI that their business is growing rapidly and has changed over the years from regular delivery to one of "just in time". As a result, the capacity level must factor the considerations of its customer, the commercial industry.

With the proposed 2005 summer schedule, the traffic demand will reach AEU capacity of the fleet on the Port aux Basques-North Sydney service by 2008. Previously, to provide short-term additional capacity, the Company recommended chartering a fast ferry with 500 passengers and 160 AEU capacity providing one round trip per day. This is the same capacity as the Max Mols, which provided service on the Gulf Service in 2000. However, further analysis of the present fleet and the restrictions that must be overcome demand a broader examination of the entire operation. MAI's current position on this will be explained further in Option 1.

Three fundamental assumptions will be used for all modeling :

- The nature of the traffic demand will require vessels with high lane-metre to passenger ratios (LnM/PAX). This is due to the level of commercial traffic and the low level of passenger traffic for 50% of the year;
- Passenger (PAX) traffic increases will occur during the period mid-June through mid-September, and;
- Commercial tractor trailer (TT) and drop trailer (DT) traffic will continue to increase given the strong economic outlook for Newfoundland and Labrador.

It will be demonstrated that these fundamental assumptions have a profound effect on the type of fleet that can efficiently meet the forecasted demand using the current MAI infrastructure.

Model Description

The Strategic Fleet Model is fundamentally an accounting system that monetizes principle parameters defining the fleet and its operation in an environment that is easy to reconfigure to test various 'what-if' scenarios. The interaction between the relevant parameters is the analytical core of the model. These parametric relationships are based on real and proven, industry accepted theoretical analytical processes.

The model is constructed on a building block approach. Each significant parameter is modeled in a single module. Each module is tested individually against actual ship data to ascertain that the values returned represents realistic, current, best practice values. Multiple modules define a ship and multiple ships define the fleet. Each module uses data for that particular ship and all ship models use standard data that is served to them from a central database. In total the Strategic Model can concurrently simulate eight vessels over a 17 year period (2004 to 2020) using a total of 16 modules for each ship. Changing one parameter in a fleet model sets off a recalculation of the model that involves approximately 70,000 inter-related formulas and logical branches.

Controls and Objectives

The models are controlled by setting the environment for all ships through changes in the central database (GLOBAL DATA). Each scenario or option is investigated by first defining the ships that will be used within the fleet. This is done by entering values such as LOA, displacement, DWT, speed, propulsion power, cost, crew size, etc. for each ship.

Once the fleet is defined, each ship can be put into service on a seasonal and annual basis. It is important to note that the Strategic model works on ***1 year*** as its smallest unit of measure. Seasonal variations in traffic are accounted for by defining the Summer and Winter seasons as a fractions of the year and allocating parameters accordingly.

Having specified the environment, ships and service; the final step in the analysis is to interrogate the results to determine whether the fleet configuration meets demand, how much revenue is generated and, how much it costs to operate the fleet before and after financing and depreciation.

Output

The focus of the Strategic model is the Fleet Financial Summary. This is a compilation of all the expenses and revenue calculated for each ship in that particular option. The format of the Financial Summary follows that of the "Review of BC Ferry Corporation and Alternative Uses for the Fast Ferries" prepared by Fred R. Wright for the British Columbia Ferry Corporation in 2001. The financial summary template is used for each ship in the fleet and is then summed for the Fleet Financial Summary.

The data provided is represented graphically to show :

- operating expenses by year by ship
- operating cash flow (annual and cumulative)
- net income after depreciation and financing (annual and cumulative)
- revenue source breakdown
- operating expense source breakdown

Input

The model deals with the interaction of global, far-reaching parameters that directly affect the fiscal bottom line. The data input into the model is therefore very basic as an excess of low-order data would over-burden the model without improving the accuracy or usefulness of the results. Key values such as traffic demand, fuel costs, crew salaries, fares and interest rates are entered into the GLOBAL DATA file. This ensures a valid comparison as each ship model as each option uses the same values. Known values for existing ships are loaded into the various ship models to particularize them. Where certain required parameters are unknown, the model provides an estimate based on trends developed specifically for MAI's model from a database of over 100 RORO and ROPAX vessels similar to the ones being proposed in the noted options.

Analytical Process

Once the environment and ship data is entered the analysis proceeds as follows :

1) Set maximum service factor by season for each ship in the fleet
2) Enter dates for acquisition, refits (if any) and retirement or sale.
3) Set service factors by route, by ship by year
4) The model allocates demand across the fleet as follows:
    a. All vehicular traffic for each route, for each season (summer and winter) is reduced to lane-metres (LnM).
    b. DT LnMs are allocated to RORO vessels until either they reach capacity or the demand is fully satisfied by the vessels in service for the route/year/season under consideration.
    c. DT overflow, TT, AEQ LnMs and PAX traffic is allocated uniformly across the ROPAX vessels for the year route/year/season under consideration.
    d. Traffic split (% DT/TT/AEQ) for ROPAX vessels is calculated for each year
    e. PAX and LnM utilization is calculated for each vessel for each year based on the total fleet capacity for that route/season/year.
5) The traffic carried by each ship is then calculated using the Utilization Factors and Traffic Split for each route/season/year.
6) Revenue is based on the number of service days per year, utilization, traffic split and tariff by route/season/year.
7) Expenses are calculated annually based on service, speed, power, vessel age, vessel size, vessel type, etc.

Data and Result Checks

All data used within the model to develop the parametric relationships have been checked against the seed data vessels. This "seed data" is a collection of over 100 current vessels that are similar to the vessels being considered by Marine Atlantic. Questionable data has been either confirmed from multiple sources or removed from the seed data set. As noted above, each module has been checked back against the seed data to ensure returned values are reasonable and representative of current RORO and ROPAX trends.

An enormous number of data fields can be accessed directly by the user. Checks are incorporated into the individual ship models to provide visual feedback if certain limits of validity have been exceeded by the user. Other than specific, fatal errors the model will process whatever data is entered in spite of any errors noted in the various modules. This feature provides the ability to test certain limiting conditions, however, a high degree of discipline is required of the user to ensure that the final output is compliant with all model limitations and all warnings have been cleared. Additionally, many parameters can be over-written by the user to customize a particular ship model to match an actual vessel. This demands a further level of discipline in that overwritten values are static and will not update as the model recalculates.

Static vs. Dynamic

The Strategic Fleet Model is in essence static. A change in any parameter causes a chain reaction of recalculation that produce a single static set of results. The process is linear in that a change in any one parameter can be traced logically through to the final results. The advantage of this system is that it is repeatable, very robust and is capable of modeling significant changes very quickly. It is not capable of dealing with intricacies of schedule or details such as when two ships require the same shore facility at the same time or when a vessel's schedule is changed mid-week. A model capable of providing the Strategic Fleet Model with actual, ship specific service factors and utilization information needs to work in a finer time unit than a year. This type of model is described in the next section.

Time Domain, Discrete Event Models

In order to identify how the fleet actually interacts on an hour-by-hour, minute-by-minute basis the model needs to start with statistical demand data capable of providing specific information such as *"at 15:10 a car arrived at North Sydney en route to Argentia"*. This data can be synthesized from actual traffic data, traffic growth projections and randomizing factors. A different sort of model will now take this information and work logically through the discrete steps necessary to provide the vehicle and occupants with tickets, marshal the vehicle in preparation for loading, load the vessel, undock , transit to the destination and unload. Each discrete step or event will have a collection of attributes such as resources (personnel that must man the ticket booths or yarding tractors that will move the DTs) and a cycle time based on what is being done. The termination of one discrete event will potentially trigger multiple following events that may proceed in parallel or sequentially based on their relationship to one another. They will all take place in the time domain which means that the time necessary to complete a critical path of events will determine the overall time necessary to complete the model run. Decision trees will be culled from Standard Operating procedures (SOPs) or conversely will form the basis for new SOPs. The decision trees will decide which event follows which and may dynamically change the critical path as the model runs through a series of cycles or sub-cycles. The model must run through the pre-set, limiting duration (ex: 0900, 01 Jan 2004 to 0900, 31 Dec 2014) repeatedly to produce a sufficiently large statistical base.

The tactical, time domain model follows on from the strategic model in that it provides a higher level of confidence in the data being used in the strategic model. The strategic model can also use the annual data generated by the tactical model to provide a higher degree of confidence in the relative merit of specific options.

Fleet Options

Marine Atlantic's plans for meeting current traffic projections envisaged adding capacity with the use of a High Speed Craft (HSC), Option 1. This solution involved continuing to operate the present fleet and adding the HSC when the traffic volumes demanded it. In the short term this option may be viable, however in terms of a long-term strategy MAI has focused on moving ahead with plans to reconfigure the entire fleet to meet the expected traffic offering and to provide the level of service demanded by its customers.

The first stage of this reconfiguration has been initiated with the assessment and condition survey of the Caribou and Smallwood. The survey will provide technical recommendations for cost effective upgrades. Should the fleet modeling conclude a mid-life refit program is the most advantageous for MAI, these vessels would be improved and upgraded to meet upcoming regulatory changes and improve the operation and maintainability of various systems. This would extend the life of these vessels, however, the AEU capacity would remain unchanged. Capacity can only be increased with faster crossings, with shorter turn around times, with the addition of larger vessels having more AEU capacity, or a combination of thereof.

Marine Atlantic Inc. has identified the following fleet renewal and upgrade options for study. The options have been modeled to provide a method of comparing the long-term financial implications of various fleet reconfiguration decisions.

Option 0 Status Quo (SQ)

Option 1 Status Quo and Charter a High Speed Craft for summer

Option 2 Status Quo and Charter ROPAX for the summer

Option 3 Sell Atlantic Freighter and Purchase 1 + 1 new ROPAX

Option 4 Sell Atlantic Freighter and Charter 1 + 1 New ROPAX

Option 5 Sell Freighter and Leif and buy new Fast ROPAX

Option 6 Sell Caribou, Smallwood and Freighter buy 2 + 1 New ROPAX

Option 7 Replace the existing fleet with 1 new RORO and 3 New ROPAX

Option 8 Sell Freighter & Leif and buy New RORO

Option 9 Replace the Fleet with New ROPAX (3+1 Commercial)

Option 10 Replace the Fleet with New ROPAX (4 Identical)

Each option will be considered from a safety, customer service, human resource, operational and financial perspective. The report will provide a recommendation for the future configuration for MAI's fleet once all the information is available. A preliminary analysis of each option follows and in 2005 a finalized report will be available.

Option 0 - Status Quo

This option assumes that nothing is changed and the fleet continues on as-is until it no longer has the capacity to meet the growing demand. It is provided as a baseline to measure the relative merit of all other options.

Fleet Configuration

Generally, the fleet is well balanced with the Atlantic assisting in offsetting the high LnM to PAX ratio that is characteristic of Marine Atlantic's traffic in the winter and summer. The fleet is aging and lacks redundancy which has occasionally left Marine Atlantic short when a vessel is unavailable during the summer. Two vessels, the Leif Ericson and the Atlantic Freighter are both underutilized due to the limited capabilities of the assets. Should Transport Canada implement mandatory SOLAS 90 compliance for ROPAX vessels in 2005, the Smallwood and Caribou would have their cargo deadweight limited to a mere fraction of its current value making their operation financially impractical and eliminating any possibility of meeting the expected demand. In order to correct this situation the side casings will need to be made watertight, possibly requiring $2M per ship to implement by 2006.

Using a capacity criteria of +15% over nominal annual demand to account for peak demand during summer weekends, the fleet fails to meet demand in 2006 onward suggesting that something needs to change in the fleet in the near-term.

The cornerstones of the fleet are the MV "Joseph & Clara Smallwood" and the MV "Caribou". Both vessels are structurally sound and have efficient vehicle space arrangements by modern standards. The Smallwood is different than the Caribou in a number of significant ways, the most notable operational difference is that the Smallwood has an internal ramp to compensate for the fact that the Argentia terminal has no shore link-span on the Upper Vehicle Deck level. The two vessels are purpose designed for the route and service and have proven themselves capable of dealing with the rigors of severe winter weather and moderate ice cover while providing comfortable accommodation for the passengers. The vessels have occasionally been stuck in the ice approaching the Sydney terminal and have repeatedly suffered from ice damage backing into both the North Sydney and Port aux Basques terminals. Both suffer from chronic problems with propulsion system vibration that has had an minor impact on their operational flexibility since they were built. The vessels are well past their prime and rapidly approaching what most operators consider the end of a ROPAX vessel's useful lifespan but are still structurally sound. The most noticeable deterioration is in each ship's auxiliary systems which are, in some cases, no longer supported by their vendors. An extensive refit of one or both vessels is presently under consideration by Marine Atlantic. The intention is to capitalize on the sound structure and to correct issues with the ship's systems by upgrading or replacing problematic components and/or entire systems. The refit budget varies between $50M and $120M depending on the extent of the upgrades required. An assessment of the vessels to determine the extent of the refit needed has been completed and is to be followed by cost-benefit studies to ascertain the most economic methods of upgrading the noted existing systems. These studies will provide Marine Atlantic with the information necessary to decide on the future of these venerable ships.

The Leif Ericson was purchased used by Marine Atlantic in 2000 and modified for service on both the Port aux Basques and Argentia routes. It is operated primarily in the summer months to avoid the more severe winter weather. The vessel is significantly smaller that the Smallwood and Caribou and has been the subject of numerous passenger complaints stemming from the vessel's poor sea keeping performance. This would logically stem from the vessel's smaller size, lower displacement and larger initial stability when compare to the Smallwood & Caribou. Additional complaints regarding the vessel's passenger facilities could result from incompatibility between the service the vessel was designed for and where it is currently being used. The vessel is scheduled for retirement in 2014.

The Atlantic Freighter was purchased, used, by Marine Atlantic in 1987. The vessel is the only RORO vessel in Marine Atlantic's fleet. The ability to redirect drop trailer (DT) traffic away from the ROPAX vessels has numerous operational and fiscal benefits.

- DT traffic requires significantly more time/unit to load than TTs or AEUs.
- RORO vessels are 40% of the purchase price and 41% less expensive to operate on a $$/LnM basis than ROPAX vessels.
- RORO vessels can improve the utilization of terminal facilities by scheduling loading and discharge times away from the PAX driven preferred terminal times ROPAX vessels tend towards.

The Atlantic Freighter is well beyond what is typically considered a useful lifespan. Systems are aging and becoming more difficult to maintain.

The present fleet consists of the following assets:

Joseph & Clara Smallwood [ROPAX]
LOA: 178.8 m (586ft-7.37in)
PAX: 1,223
Lane Metres: 1,920 m (6,299ft)
AEU: 360
Speed: 19 knots
Power: 20,880 kW (27,989 BHP)

Caribou [ROPAX]
LOA: 179 m (587ft-3.24in)
PAX: 1,200
Lane Metres: 1,920 m (6299ft)
AEU: 360
Speed: 19 knots
Power: 20,880 kW (27,989 BHP)

Leif Ericson [ROPAX]
LOA: 157 m (515ft-1.10 in)
PAX: 500
Lane Metres: 1,468 m (4,816ft)
AEU: 275
Speed: 18 knots
Power: 21,110 kW (28,298 BHP)

Atlantic Freighter [RORO]
LOA: 154.43 m (506ft-7.92in)
PAX: 12
Lane Metres: 1,350 m (4,429ft)
AEU: 253
Speed: 18 knots
Power: 11,638 kW (15,601 BHP)

Option 0

YEAR	AF	RORO	CAR	SML	LE	ROPAX			Demand
		1				1	2	3	
2004	N-P		N-P	N-P-A	N-P				OK
2005	N-P		N-P	N-P-A	N-P				OK
2006	N-P		N-P	N-P-A	N-P				OK
2007	N-P		N-P	N-P-A	N-P				OK
2008	N-P		N-P	N-P-A	N-P				FAIL
2009	N-P		N-P	N-P-A	N-P				FAIL
2010	N-P		N-P	N-P-A	N-P				FAIL
2011	N-P		N-P	N-P-A	N-P				FAIL
2012	N-P		N-P	N-P-A	N-P				FAIL
2013	N-P		N-P	N-P-A	N-P				FAIL
2014	N-P		N-P	N-P-A	N-P				FAIL
2015	N-P		N-P	N-P-A	N-P				FAIL
2016	N-P		N-P	N-P-A	N-P				FAIL
2017	N-P		N-P	N-P-A	N-P				FAIL
2018	N-P		N-P	N-P-A	N-P				FAIL
2019	N-P		N-P	N-P-A	N-P				FAIL
2020	N-P		N-P	N-P-A	N-P				FAIL

Positives to this option

- ✓ The present infrastructure (crew, terminals, etc) all match the fleet requirements;
- ✓ No capital outlay is required, and;
- ✓ Current traffic demand is being met.

Negatives to this option

- ⇩ Based on MAI’s projected traffic growth, demand will exceed capacity by 2008;
- ⇩ Maintenance cost will continue to escalate as the existing fleet is already beyond its prime and parts will become increasingly more difficult to find;
- ⇩ The reliability of systems and ultimately ships will deteriorate as the vessels age;
- ⇩ Ultimately the availability of the vessels will suffer as they spend more and more time in work periods that will be required to correct system malfunctions;
- ⇩ Passenger complaints will increase as traffic will be stranded due to inadequate capacity or cancelled sailings due to mechanical failures;
- ⇩ The potential for cascade or catastrophic failure increases as system redundancy is eroded due to mechanical deterioration.

Option 1 - Status Quo and Charter a HSC for the Summer

Chartering a High Speed Craft (HSC) or conventional ROPAX vessel could carry MAI through beyond 2020. The HSC modeled (Max Mols) does not have sufficient capacity to allow for the refit of either the Smallwood or Caribou and still meet demand. The existing fleet will continue to age and maintenance costs will escalate, as surveys become more stringent and new, more onerous regulations are put in place. Spare parts for existing equipment on these aging vessels will become more difficult to obtain. This is a reality experienced in recent years when attempting to procure equipment for the Caribou and Smallwood, in particular electronic equipment.

The costs associated with operating a HSC are significant. MAI experienced this when operating the Max Mols in 2000. The Company was faced with hiring additional personnel to crew the vessel. The crew also required additional training to work on a HSC. The daily maintenance costs for this type of vessel were higher than anticipated. In addition, when the weather was unfavourable the HSC had difficulty meeting the schedule. In fact, there were times it could not sail. This is not acceptable during the high seasonal summer period.

Accommodations for crewmembers are another difficulty with the purchase or Bare-Boat (BB) charter of a HSC. The existing fleet has sufficient accommodations for all crew during their tour of duty. A HSC is a day vessel and is not equipped with any crew accommodations. For this reason, an arrangement would be required with the unions to satisfy the existing collective agreements. Associated with this is the need to acquire accommodations for the chartered vessel's crew during the entire charter period. Consequently, a time charter would be preferable to ensure crewing needs were met.

The installation of proper loading infrastructure would be required at the terminals in Port aux Basques and North Sydney to meet the needs of a HSC. As well, with the addition of a fifth vessel the schedule would become even more congested. MAI estimates the HSC could manage the traffic expectations with a single round trip per day, however this may receive public scrutiny. This vessel was very popular with the traveling public in the past and it is anticipated the public would pressure for more than one trip. The costs to operate this vessel including a premium for a seasonal charter, mobilization and demobilization costs, infrastructure changes, additional staff, fuel, maintenance, taxes, crew accommodations and crew shadowing if an agreement cannot be reached with the union would not make it practical to operate the vessel for a single crossing each day. The estimated cost to simply operate a HSC for 120 days would be in the region of $8M to $9M dollars.

In this option the fleet consists of the following assets:

Joseph & Clara Smallwood [ROPAX]

Caribou [ROPAX]

Leif Ericson [ROPAX]

Atlantic Freighter [RORO]

Max Mols [HSC]

LOA: 91 m (298ft-6.68in)
PAX: 800
Lane Metres: 990 m (3,248ft -0.38in)
AEU: 185
Speed: 42 knots
Power: 28,880 kW (38,713 BHP)

Figure 1 - HSC Max Mols

Option 1

YEAR	AF	RORO	CAR	SML	LE	ROPAX			Demand
		1				Charter	2	3	
2004	N-P		N-P	N-P-A	N-P				OK
2005	N-P		N-P	N-P-A	N-P				OK
2006	N-P		N-P	N-P-A	N-P				OK
2007	N-P		N-P	N-P-A	N-P	N-P			OK
2008	N-P		N-P	N-P-A	N-P	N-P			OK
2009	N-P		N-P	N-P-A	N-P	N-P			OK
2010	N-P		N-P	N-P-A	N-P	N-P			OK
2011	N-P		N-P	N-P-A	N-P	N-P			OK
2012	N-P		N-P	N-P-A	N-P	N-P			OK
2013	N-P		N-P	N-P-A	N-P	N-P			OK
2014	N-P		N-P	N-P-A	N-P	N-P			OK
2015	N-P		N-P	N-P-A	N-P	N-P			OK
2016	N-P		N-P	N-P-A	N-P	N-P			OK
2017	N-P		N-P	N-P-A	N-P	N-P			OK
2018	N-P		N-P	N-P-A	N-P	N-P			OK
2019	N-P		N-P	N-P-A	N-P	N-P			OK
2020	N-P		N-P	N-P-A	N-P	N-P			FAIL

Positives to this option

- ✓ HSC may be perceived as a move towards more modern technology by the public
- ✓ Charter costs would be spread over the charter period;
- ✓ The speed of the vessel allows for many capacity options; and
- ✓ No major capital outlay.

Negatives to this option

- ⇩ None of the negatives addressed in Option 0 – Status Quo are addressed.
- ⇩ Insufficient capacity to cover the loss of service of either Caribou or Smallwood during the summer. This eliminates the possibility of a mid-life refit for this option.
- ⇩ Vessel availability for service may be poor due to adverse weather even in summer;
- ⇩ Charter costs are high (seasonal);
- ⇩ HSC maintenance costs are high;
- ⇩ Very limited established local infrastructure to deal with aluminium construction;
- ⇩ Maintenance costs will escalate with existing fleet;
- ⇩ Crewing could be problematic (charter/union issues);
- ⇩ Accommodations issues;
- ⇩ Depending on the type of vessel it may only carry passenger related vehicles;
- ⇩ Potential schedule congestion with the addition of a fifth vessel;
- ⇩ Weather conditions could result in delayed or missed sailings; and
- ⇩ Infrastructure additions/modifications.

Option 2 - Status Quo and Charter a New ROPAX

The charter of an additional vessel while maintaining the existing fleet would provide MAI with a degree of stability eliminating the risk of the charter market forces. The same issues prevail however, in particular, maintaining an aging fleet, additional seasonal crew requirement and schedule congestion with a fifth vessel in service.

The key operational difference between Option 2 and Option 1 is that the new vessel can be sized to compensate for the loss of the Atlantic Freighter in 2008. Unfortunately it is not considered economically feasible to acquire a new vessel prior to 2008 which means that this fleet option would not meet the demand during the proposed refit of the Caribou and Smallwood earlier than 2008. This may be a significant hurdle in light of Transport Canada's plans to implement SOLAS 90 for all ROPAX vessels in 2005.

The charter of a conventional ROPAX ferry for the same period each year brings similar problems as the HSC. Although the vessel would have crew accommodations, additional personnel including deck and engine room officers would be required. Finding employees to cover these two areas on a seasonal basis will be problematic as noted previously. For the same reason as the HSC, a time charter would be preferable.

Although infrastructure changes would be minimal, the vessel ramps and visor may not be acceptable for the current terminal ramp loading systems. The system employed at Marine Atlantic was developed specifically for the existing fleet. The Leif Ericson required modifications to its ramps for it to use the existing terminal ramp loading and unloading systems. This is a major problem with a chartered vessel given the owner would expect any temporary modifications to the vessel to be reversed each year. Consistent with the HSC, a single round trip per day would satisfy the capacity requirements. As with the HSC, in order to secure a multi-year seasonal charter a substantial premium is anticipated from the owner. In addition, costs to operate this vessel include; mobilization and demobilization costs, additional staff, fuel, maintenance, taxes, and crew shadowing if an agreement cannot be reached with the union would not make it practical to operate the vessel for a single crossing a day.

In this option the fleet consists of the following assets:

<u>Joseph & Clara Smallwood [ROPAX]</u>

<u>Caribou [ROPAX]</u>

<u>Leif Ericson [ROPAX]</u>

<u>Atlantic Freighter [RORO]</u>

<u>Charter Vessel [ROPAX]</u>

LOA: 190 m (623ft-4.22in)
PAX: 1,200
Lane Metres: 2,704 m (8,870ft)
AEU: 506
Speed: 24 knots
Power: 27,084 kW (36,308 BHP)

Figure 2 – 190m ROPAX

Option 2

YEAR	AF	RORO 1	CAR	SML	LE	ROPAX Charter	ROPAX 2	ROPAX 3	Demand
2004	N-P		N-P	N-P-A	N-P				OK
2005	N-P		N-P	N-P-A	N-P				OK
2006	N-P		N-P	N-P-A	N-P				OK
2007	N-P		N-P	N-P-A	N-P	N-P			OK
2008	N-P		N-P	N-P-A	N-P	N-P			OK
2009	N-P		N-P	N-P-A	N-P	N-P			OK
2010	N-P		N-P	N-P-A	N-P	N-P			OK
2011	N-P		N-P	N-P-A	N-P	N-P			OK
2012	N-P		N-P	N-P-A	N-P	N-P			OK
2013	N-P		N-P	N-P-A	N-P	N-P			OK
2014	N-P		N-P	N-P-A	N-P	N-P			OK
2015	N-P		N-P	N-P-A	N-P	N-P			OK
2016	N-P		N-P	N-P-A	N-P	N-P			OK
2017	N-P		N-P	N-P-A	N-P	N-P			OK
2018	N-P		N-P	N-P-A	N-P	N-P			OK
2019	N-P		N-P	N-P-A	N-P	N-P			OK
2020	N-P		N-P	N-P-A	N-P	N-P			OK

Positives to this option

- ✓ Required increase in capacity for all types of traffic;
- ✓ Potentially less overtime for the labour force;

Negatives to this option

- ⇩ As in Option 0, maintenance costs are high and will escalate with existing fleet; and
- ⇩ Operations costs are high especially during over capacity times
- ⇩ Terminal congestion caused by additional vessel.

Option 3 - Sell the Atlantic Freighter and Purchase 1 + 1 New ROPAX

As stated earlier, the capacity of a vessel is not only measured by its carrying capacity but also by the speed each voyage can be completed and by how fast the vessel can be turned around (port time). Against current industry standards, the Atlantic Freighter is slow and her stern loading configuration results in lengthy port times to unload and load. These impact the schedule options and potentially can cause the overall operation to be inefficient. If the best option was to maintain the Caribou, Smallwood and the Leif Ericson, the purchase of a RORO vessel with limited passenger capacity (12) could be an option. It is important that any replacement vessel meet the requirements and growing demand of the commercial customers. For that reason, the capacity needs to be greater than that of the Atlantic Freighter. In order to have a greater passenger carrying capacity to serve the needs of the driver accompanied commercial traffic, the new vessel would need to be a ROPAX as Transport Canada limits the passenger capacity to 12 for “Non-Passenger” vessels. The Atlantic Freighter is a RORO vessel and is limited to 12 passengers, which equates to only 12 driver accompanied vehicles per trip. A faster, larger, ROPAX will alleviate some of the capacity issues but will not meet all of MAI’s DT capacity needs as Marine Atlantic’s commercial customers will still expect to be moved to some degree on every sailing.

Marine Atlantic must look to future needs for the carriage of passengers; passenger related vehicles, as well as all types of commercial vehicles. Recently, when the Caribou had to be taken out of service for repairs, passenger traffic as well as the commercial traffic were affected, although, the impact on the commercial traffic was less severe than on the passenger traffic. When considering a replacement for the Atlantic Freighter the future use of the Leif Ericson must also be taken into account. The Leif Ericson could take the place of the Atlantic Freighter providing the desired commercial lane metres. This arrangement would also provide the desired degree of flexibility to carry passengers when the need arises. However, if the Leif Ericson were to assume the primary freight role a replacement would be required for the passenger-carrying capacity of that vessel.

The fleet consists of the following assets:

<u>Joseph & Clara Smallwood [ROPAX]</u>
Refit in 2008

<u>Caribou [ROPAX]</u>
Refit in 2007

<u>Leif Ericson [ROPAX]</u>
Operated per existing until 2008, then as replacement for Atlantic Freighter as ROPAX with 144 PAX Until 2014

<u>Atlantic Freighter [RORO]</u>
Until 2008

<u>New Vessel [ROPAX]</u>
- LOA: 195 m (639ft-9.17in)
- PAX: 900
- Lane Metres: 2,775 m (9,103ft)
- AEU: 520
- Speed: 24 knots
- Power: 26,521 kW (35,551 BHP)

New Vessel [ROPAX]
- LOA: 180m (590ft-6.61in)
- PAX: 900
- Lane Metres: 2,466 m (8,092ft)
- AEU: 462
- Speed: 24 knots
- Power: 27,208 kW (36,473 BHP)

Option 3

YEAR	AF	RORO	CAR	SML	LE	ROPAX				
		1				1	2	3		
2004	N-P		N-P	N-P-A	N-P				OK	
2005	N-P		N-P	N-P-A	N-P				OK	
2006	N-P		N-P	N-P-A	N-P				OK	
2007	N-P		N-P	N-P-A	N-P				OK	
2008			N-P	REFIT	N-P-A	N-P			OK	
2009			REFIT	N-P-A	N-P	N-P			OK	
2010			N-P	N-P-A	N-P	N-P			OK	
2011			N-P	N-P-A	N-P	N-P			OK	
2012			N-P	N-P-A	N-P	N-P			OK	Demand
2013			N-P	N-P-A	N-P	N-P			OK	
2014			N-P	N-P-A		N-P	N-P		OK	
2015			N-P	N-P-A		N-P	N-P		OK	
2016			N-P	N-P-A		N-P	N-P		OK	
2017			N-P	N-P-A		N-P	N-P		OK	
2018			N-P	N-P-A		N-P	N-P		OK	
2019			N-P	N-P-A		N-P	N-P		OK	
2020			N-P	N-P-A		N-P	N-P		OK	

Positives to this option

- ✓ Required increase in capacity for all types of traffic until 2014;
- ✓ Faster turn around time with bow-stern loading configuration in all vessels;
- ✓ Potentially less overtime for the labour force;
- ✓ Less schedule congestion;
- ✓ Potentially if the Caribou and Smallwood complete mid-life refits, there is a possibility MAI would still have sufficient capacity without adding replacement vessels;
- ✓ There would be a return from the sale of the Atlantic Freighter; and
- ✓ Existing services in place for all crewmembers.

Negatives to this option

- ⇩ Large capital outlay;
- ⇩ A significant portion of the overall fleet capacity resides in one vessel in that the proposed vessel has 1,000 lane-metres more capacity than the Caribou or Smallwood. The unexpected loss of service of this vessel during a peak demand may be very difficult to recover from with the remaining assets.
- ⇩ Maintenance costs will still be high for all systems not replaced or upgraded during the refit and will escalate with the existing fleet; and
- ⇩ Operations costs are high especially during over capacity times.

Option 4 - Sell the Freighter and Charter 1 + 1 New ROPAX

The Atlantic Freighter is in service for approximately 120 days each year and on standby or in cold lay up for the remainder of the year. This is not the best use of such a resource, however it does provide MAI protection against unplanned events that chartering would not provide. If the best option were to maintain the Caribou, Smallwood and the Leif Ericson, the charter of a larger ROPAX vessel with limited passenger capacity (more than the Freighter) would be an option.

The term of the charter would be six months from May 1st to October 31st. A six-month term is desirable for standby and operational duty while the Marine Atlantic owned vessels complete planned work periods (PWP) and refits. Such a seasonal charter is possible in the markets, however the premium on seasonality will be expensive as owners of this type of vessel are either operating on a planned route basis or in a spot cargo market.

As explained previously, although infrastructure changes would be minimal, the vessel ramps and visor configuration may not be acceptable for the current terminal ramp loading systems.

The fleet consists of the following assets:

<u>Joseph & Clara Smallwood [ROPAX]</u>
Refit in 2008

<u>Caribou [ROPAX]</u>
Refit in 2007

<u>Leif Ericson [ROPAX]</u>
Operated per existing until 2008, then as replacement for Atlantic Freighter as ROPAX with 144 PAX Until 2014

<u>Atlantic Freighter [RORO]</u>
Until 2008

<u>Charter Vessel [ROPAX]</u>
LOA: 205 m (672ft-6.87in)
PAX: 1,200
Lane Metres: 2,917 m (9,570ft)
AEU: 546
Speed: 22 knots
Power: 19,826 kW (26,577 BHP)

<u>New Vessel [ROPAX]</u>
LOA: 180 m (590ft-6.53in)
PAX: 900
Lane Metres: 2,466 m (8,090ft)
AEU: 462
Speed: 24 knots
Power: 27,208 kW (36,474 BHP)

Figure 3 – 185m ROPAX

Option 4

YEAR	AF	RORO	CAR	SML	LE	ROPAX				
		1				1	2	3		Demand
2004	N-P		N-P	N-P-A	N-P				OK	
2005	N-P		N-P	N-P-A	N-P				OK	
2006	N-P		N-P	N-P-A	N-P				OK	
2007	N-P		N-P	N-P-A	N-P	N-P			OK	
2008			REFIT	N-P-A	N-P	N-P-A			OK	
2009			N-P	REFIT	N-P	N-P-A			OK	
2010			N-P	N-P-A	N-P	N-P			OK	
2011			N-P	N-P-A	N-P	N-P			OK	
2012			N-P	N-P-A	N-P	N-P			OK	
2013			N-P	N-P-A	N-P	N-P			OK	
2014			N-P	N-P-A		N-P	N-P		OK	
2015			N-P	N-P-A		N-P	N-P		OK	
2016			N-P	N-P-A		N-P	N-P		OK	
2017			N-P	N-P-A		N-P	N-P		OK	
2018			N-P	N-P-A		N-P	N-P		OK	
2019			N-P	N-P-A		N-P	N-P		OK	
2020			N-P	N-P-A		N-P	N-P		OK	

Positives to this option

- ✓ No major capital outlay until 2014;
- ✓ Charter costs would be spread over the charter period;
- ✓ Required increase in capacity for all types of traffic until 2014 when the Leif retires; and
- ✓ Existing services in place for all crewmembers.

Negatives to this option

- ⇩ Marine Atlantic would depend on securing the same or similarly sized vessel year after year as a significant portion of their annual traffic depends on the availability of the chartered vessel. Should they be unable to secure such a large ROPAX one year through some unforeseen event, they would be forced to charter two smaller vessels and a significant premium to meet demand. This would prove very disruptive to scheduling, crew services, unions, etc.
- ⇩ It is possible that the required ROPAX would not be available for charter as few older vessels operating on the North Sea and Baltic routes are of this size.
- ⇩ Charter costs are high (seasonal);
- ⇩ Vessel modifications could prove expensive;
- ⇩ Crewing could be problematic (charter/union issues);
- ⇩ Maintenance costs will still be high for all systems not replaced or upgraded during the refit and will escalate with the existing fleet.

Option 5 - Sell Atlantic Freighter & Leif Ericson and Buy a New ROPAX

Should MAI decide to go ahead with the mid-life refit of the Caribou and Smallwood, a further scenario would be to reduce the fleet to three vessels by selling the Atlantic Freighter and the Leif Ericson and replacing these two vessels with a faster vessel. The Caribou and Smallwood mid-life refit program can only be carried out during the winter and non-peak season months due to the demand during the summer season. Subject to the extent of the refit, with good planning it is estimated that it will take 6 - 9 months at a shipyard facility to complete each vessel. The sequence of events must be carefully considered during this time.

The new vessel would be a sophisticated ferry having a similar AEU capacity to the existing superferries but would be significantly faster. Speed becomes essential to having the desired capacity while operating a three-vessel fleet. Unfortunately, high-speed vessels have notoriously poor cargo capacity. The main factors affecting power are speed and weight. Above a point increasing one forces you to lower the other. This alternative could possibly be made to meet demand by reducing the commercial traffic on the fast ferry to minimize turn-around time. Unfortunately the Strategic model cannot accurately predict the outcome of detailed scheduling decisions.

The fleet consists of the following assets:

<u>Joseph & Clara Smallwood [ROPAX]</u>
Refit in 2008

<u>Caribou [ROPAX]</u>
Refit in 2007

<u>Leif Ericson [ROPAX]</u>
Until 2008

<u>Atlantic Freighter [RORO]</u>
Until 2008

<u>New Vessel [ROPAX]</u>
LOA: 194.3 m (637ft-5.61in)
PAX: 1,400
Lane Metres: 1,852 m (6,076ft)
AEU: 347
Speed: 29 knots
Power: 42,240kW (56,622 BHP)

Figure 4 – 190m ROPAX

Option 5

YEAR	AF	RORO	CAR	SML	LE	ROPAX				Demand
		1				1	2	3		
2004	N-P		N-P	N-P-A	N-P				OK	
2005	N-P		N-P	N-P-A	N-P				OK	
2006	N-P		N-P	N-P-A	N-P				OK	
2007	N-P		N-P	N-P-A	N-P				OK	
2008			REFIT	N-P-A	N-P	N-P			FAIL	
2009			N-P	REFIT		N-P			FAIL	
2010			N-P	N-P-A		N-P			FAIL	
2011			N-P	N-P-A		N-P			FAIL	
2012			N-P	N-P-A		N-P			FAIL	
2013			N-P	N-P-A		N-P			FAIL	
2014			N-P	N-P-A		N-P			FAIL	
2015			N-P	N-P-A		N-P			FAIL	
2016			N-P	N-P-A		N-P			FAIL	
2017			N-P	N-P-A		N-P			FAIL	
2018			N-P	N-P-A		N-P			FAIL	
2019			N-P	N-P-A		N-P			FAIL	
2020			N-P	N-P-A		N-P			FAIL	

Positives to this option

- ✓ Required increase in capacity for all types of traffic;
- ✓ Faster turn around time with bow & stern ramp configuration;
- ✓ Potentially less overtime for the labour force;
- ✓ Less schedule congestion;
- ✓ MAI would maintain a four-vessel fleet until the completion of the mid-life refits of the Caribou and Smallwood ;
- ✓ There would be a return from the sale of the Atlantic Freighter and Leif Ericson; and
- ✓ Existing services in place for all crewmembers.

Negatives to this option

- ⇩ The fleet does not have the capacity to meet demand;
- ⇩ High speed vessels are not well suited to carry commercial vehicles as they are DWT limited and require fast turn-arounds to meet aggressive schedules.
- ⇩ No redundancy within fleet capacity;
- ⇩ Operations/Maintenance costs on four vessels through the mid-life refit period;
- ⇩ Potentially still require peak season capacity to address PRV's. Unless this vessel has both a passenger and commercial configuration the summer season passenger traffic would potentially not be fully addressed;
- ⇩ Operations costs are high especially during periods of over capacity;
- ⇩ Infrastructure additions/modifications;
- ⇩ Vessel modifications could prove expensive; and
- ⇩ Maintenance costs of ownership are high and will escalate with existing fleet.

Option 6 - Sell Caribou, Smallwood & Freighter & buy 2+1 new ROPAX

The option of replacing the Caribou and Smallwood is one that can be better considered after the mid-life refit information is available. Although Rough Order of Magnitude (ROM) pricing was carried out during 2002, this pricing was based on a broadly similar vessel to the two superferries. With the increased capacity requirements these vessels would need to be larger than at present and at least one of them would have to be capable of speeds far greater than the present ferries to meet a three vessel fleet configuration.

The fleet consists of the following assets:

<u>Joseph & Clara Smallwood [ROPAX]</u>
Until 2012

<u>Caribou [ROPAX]</u>
Until 2010

<u>Leif Ericson [ROPAX]</u>
Until 2014

<u>Atlantic Freighter [RORO]</u>
Until 2008

<u>New Vessel (2) [ROPAX]</u>
LOA: 200 m (656ft-1.92in)
PAX: 1,000
Lane Metres: 2,951 m (9,681ft)
AEU: 553
Speed: 23 knots
Power: 23,282 kW (31,209 BHP)

<u>New Vessel (1) [ROPAX]</u>
LOA: 185 m (606ft-11.38in)
PAX: 800
Lane Metres: 2,437 m (7,995ft)
AEU: 456
Speed: 26 knots
Power: 36,618 kW (49,086 BHP)

Figure 5 – 200m ROPAX

Option 6

YEAR	AF	RORO	CAR	SML	LE	ROPAX				
		1				1	2	3		
2004	N-P		N-P	N-P-A	N-P				OK	Demand
2005	N-P		N-P	N-P-A	N-P				OK	
2006	N-P		N-P	N-P-A	N-P				OK	
2007	N-P		N-P	N-P-A	N-P				OK	
2008			N-P	N-P-A	N-P	N-P			OK	
2009			N-P	N-P-A	N-P	N-P			OK	
2010					N-P	N-P	N-P-A		OK	
2011					N-P	N-P	N-P-A		OK	
2012					N-P	N-P	N-P-A		OK	
2013					N-P	N-P	N-P-A		OK	
2014						N-P	N-P	N-P-A	OK	
2015						N-P	N-P	N-P-A	OK	
2016						N-P	N-P	N-P-A	OK	
2017						N-P	N-P	N-P-A	OK	
2018						N-P	N-P	N-P-A	OK	
2019						N-P	N-P	N-P-A	OK	
2020						N-P	N-P	N-P-A	OK	

Positives to this option

- ✓ Required increase in capacity for all types of traffic
- ✓ Faster turn around time with bow and stern door configuration;
- ✓ Potentially less overtime for the labour force;
- ✓ Less schedule congestion;
- ✓ There would be a return from the sale of the Atlantic Freighter, Caribou and Smallwood;
- ✓ Existing services in place for all crewmembers.
- ✓ Crew reductions

Negatives to this option

- ⇩ Large capital outlay;
- ⇩ It is unlikely that a vessel could be financed, designed, built and put in service earlier than 2008. Potentially, through careful modifications of the present schedule the existing fleet may meet demand until 2006. MAI may need to charter an additional vessel during 2007 greatly complicating the logistics of operating the fleet and reducing the financial benefits of this option.
- ⇩ Possibility of a three-vessel fleet that would be incapable of meeting demand if one of the three vessels was unexpectedly laid up due to an unforeseen mechanical problem.

Option 7 - Replace the fleet with 1 new RORO and 3 new ROPAX

This option has been provided to demonstrate the benefits of introducing new tonnage into the fleet. It is, in effect, the converse of Option 0 – Status Quo.

The strategy is to replace the fleet incrementally, reaping the benefits of new technologies and resulting improvements in efficiencies. These include :

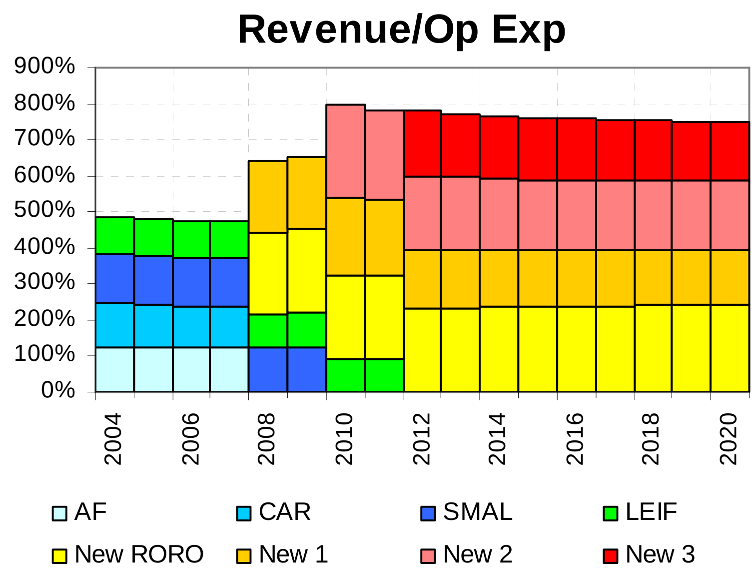
- Reduced maintenance costs.
    - Standardized, modular systems simplify maintenance and reduce required spares
    - Repair by replacement strategies where system components are easily removed and replaced facilitating repair on shore often by the vendor. This also facilitates upgrade by replacement reducing the costs of future refits.
    - Ring-main services simplifying piping repair & replacement
    - Modern equipment is invariably better designed than its predecessors using fewer parts.
- Reduced operation costs.
    - Modern analytical techniques allow engineers to design lighter structure that is as-strong and often stronger than previous. This can be translated into improved stability and/or reduced fuel usage.
    - Workflow studies, man-machine interface design and 3D simulations reduce turn-around times and resource requirements.
- Reduced acquisition costs.
    - Simplified structural and mechanical systems reduce the cost per Lane-Metre of well-designed modern ships.
    - Bulk purchasing of standardized equipment, modules and even ships has a significant impact on the overall procurement costs.

Clearly introducing new tonnage will improve the passenger and crew safety and comfort as well. Issues such as the low-quality sound insulation found on the Smallwood and ineffective heating and air conditioning found on both ships could be resolved.

The Freighter is ill suited to work within the schedule of the rest of the fleet primarily due to its stern-only loading configuration. A newer RORO vessel should be relatively easy to acquire even if it means procuring a vessel with most of the right characteristics at an agreeable price and modifying it to suit the service.

The basic strategy employed in this option stems from the following observations :

1) The rather low revenue to operating cost ratio exhibited by the existing fleet when compared to new tonnage



2) The need to provide redundancy with the fewest number of fleet assets to account for unforeseen mechanical problems and/or extreme weather in all seasons

3) The nature of the traffic demand i.e.: large component of commercial traffic. This requires a significantly different design than the majority of European ROPAX vessels in service.

4) The ability to design route-specific features into the new vessels that would improve their capability and availability. These include :
    a. Ships designed to reduce total through-life cost not just lowest procurement.
    b. Beamier ships for improved stability capable of carrying full commercial vehicle loads on both vehicle decks.
    c. Modern, efficient vehicle lashing systems to reduce turn-around times.
    d. Hoistable vehicle decks for the upper and lower vehicle space that could increase the AEU capacity by 50-60% without increasing the size of the vessel.
    e. More cabins
    f. Route specific lounges (smaller with comfortable seating), more movie lounges, more seating with tables. Large spacing between seating. This is easily accomplished as the PAX requirements are low for the ships being considered.
    g. More efficient bow shapes for reduced resistance and improved sea keeping
    h. Ice capable sterns for backing into the terminals and entering North Sydney
    i. Large thrusters and ice re-enforced rudders to reduce ice damage, or
    j. Podded propulsors to reduce manoeuvring times.

This lead Fleetway to explore the possibility of using the same asset mix that Marine Atlantic currently has (1 x RORO and 3 x ROPAX) but using modern, efficient vessels sized to meet demand beyond 2020. Curiously the very large ships required in most previous options were not required in this one. The reasons for this are that modern vessels are volumetrically more efficient (more cargo for a given ship size) than MAI's existing assets. Previous options have shown that this difference is not large enough for one new ship to compensate for 2 or 3 older ones.

Caribou :	179m LOA,	1,920 LnM
New ROPAX :	175m LOA (-2%),	2,490 LnM (+30%)

Additionally, the extreme speed required for high-speed vessels was not pursued for the following reasons :

1) MAI operates vessels in an extremely hostile and unpredictable environment. The greatest risks to high-speed passenger vessels are damage due to excessive speed in severe weather and poor passenger comfort in severe weather. Logically, operating a high-speed vessel on MAI's route with a high probability of severe weather must therefore be considered a high-risk proposition.
2) There is no support infrastructure in place for the specialized systems fitted in high-speed vessels.
3) The need to carry commercial traffic that is significantly more dense (higher weight per unit of deck space) than private vehicles leads to inefficient high speed vessel characteristics.

This suggested the following assets:

Joseph & Clara Smallwood [ROPAX]
Until 2010

Caribou [ROPAX]
Until 2008

Leif Ericson [ROPAX]
Until 2012

Atlantic Freighter [RORO]
Until 2008

New Vessel 1 [RORO]
LOA: 150 m (492ft-1.51in)
PAX: 12
Lane Metres: 1,692 m (5,549ft)
AEU: 317
Speed: 20 knots
Power: 17,068 kW (22,879 BHP)

New Vessel 1, 2 & 3 [ROPAX]
LOA: 175 m (574ft – 1.68in)
PAX: 1,000
Lane Metres: 2,490 m (8,169ft)
AEU: 466
Speed: 24 knots
Power: 28,939 kW (38,792 BHP)

Each vessel is replaced with a similarly sized one that has a greater cargo capacity.

Figure 6 – 150m RORO / 175m ROPAX

Option 7

YEAR	AF	RORO	CAR	SML	LE	ROPAX			Demand
		1				1	2	3	
2004	N-P		N-P	N-P-A	N-P				OK
2005	N-P		N-P	N-P-A	N-P				OK
2006	N-P		N-P	N-P-A	N-P				OK
2007	N-P		N-P	N-P-A	N-P				OK
2008		N-P		N-P-A	N-P	N-P			OK
2009		N-P		N-P-A	N-P	N-P			OK
2010		N-P			N-P	N-P	N-P-A		OK
2011		N-P			N-P	N-P	N-P-A		OK
2012		N-P				N-P	N-P-A	N-P	OK
2013		N-P				N-P	N-P-A	N-P	OK
2014		N-P				N-P	N-P-A	N-P	OK
2015		N-P				N-P	N-P-A	N-P	OK
2016		N-P				N-P	N-P-A	N-P	OK
2017		N-P				N-P	N-P-A	N-P	OK
2018		N-P				N-P	N-P-A	N-P	OK
2019		N-P				N-P	N-P-A	N-P	OK
2020		N-P				N-P	N-P-A	N-P	OK

Positives to this option

- ✓ Excellent reliability and availability compared to Status Quo;
- ✓ Excellent Maintainability reduces the frequency and duration of planned work periods;
- ✓ Required increase in capacity for all types of traffic;
- ✓ Faster turn around time with bow and stern door configuration;
- ✓ Potentially less overtime for the labour force;
- ✓ Simplified training with a standard ship class.
- ✓ Less schedule congestion;
- ✓ There would be a return from the sale of the Leif, Freighter, Caribou and Smallwood;
- ✓ Existing services in place for all crewmembers, and;
- ✓ Significant reductions in operating expenses.

Negatives to this option

- ⇩ Large capital outlay.

Option 8 - Sell Atlantic Freighter & Leif Ericson and Buy a New RORO

Should MAI decide to go ahead with the mid-life refit of the Caribou and Smallwood, another scenario would be to reduce the fleet to three vessels by selling the Atlantic Freighter and the Leif Ericson and replacing these two vessels with a modern RORO. The Caribou and Smallwood mid-life refit program can only be carried out during the winter and non-peak season months due to the demand during the summer season. Subject to the extent of the refit, with good planning it is estimated that it will take 6 - 9 months at a shipyard facility to complete each vessel. The program would take place from October through March over a two-year period. The sequence of events must be carefully considered during this time.

The new vessel would be a modern RORO with AEU capacity exceeding that of the Atlantic Freighter and Leif Ericson combined but would be faster. Speed becomes essential to having the desired capacity while operating a three-vessel fleet.

The fleet consists of the following assets:

<u>Joseph & Clara Smallwood [ROPAX]</u>
Refit in 2008

<u>Caribou [ROPAX]</u>
Refit in 2007

<u>Leif Ericson [ROPAX]</u>
Until 2009

<u>Atlantic Freighter [RORO]</u>
Until 2008

<u>New Vessel [RORO]</u>
LOA: 205 m (672ft-6.77in)
PAX: 12
Lane Metres: 3,082 m (10,111ft)
AEU: 577
Speed: 24 knots
Power: 34,017 kW (45,599 BHP)

Figure 7 – 205m RORO

Option 8

YEAR	AF	RORO	CAR	SML	LE	ROPAX			Demand
		1				1	2	3	
2004	N-P		N-P	N-P-A	N-P				OK
2005	N-P		N-P	N-P-A	N-P				OK
2006	N-P		N-P	N-P-A	N-P				OK
2007	N-P		N-P	N-P-A	N-P				OK
2008		N-P	REFIT	N-P-A	N-P				OK
2009		N-P	N-P	REFIT					FAIL
2010		N-P	N-P	N-P-A					FAIL
2011		N-P	N-P	N-P-A					FAIL
2012		N-P	N-P	N-P-A					FAIL
2013		N-P	N-P	N-P-A					FAIL
2014		N-P	N-P	N-P-A					FAIL
2015		N-P	N-P	N-P-A					FAIL
2016		N-P	N-P	N-P-A					FAIL
2017		N-P	N-P	N-P-A					FAIL
2018		N-P	N-P	N-P-A					FAIL
2019		N-P	N-P	N-P-A					FAIL
2020		N-P	N-P	N-P-A					FAIL

Positives to this option

- ✓ Faster turn around time with bow & stern ramp configuration;
- ✓ Potentially less overtime for the labour force;
- ✓ Less schedule congestion;
- ✓ MAI would maintain a four-vessel fleet until the completion of the mid-life refits of the Caribou and Smallwood ;
- ✓ There would be a return from the sale of the Atlantic Freighter and Leif Ericson; and
- ✓ Existing services in place for all crewmembers.

Negatives to this option

- ⇩ The fleet does not have the capacity to meet demand;
- ⇩ No redundancy within fleet capacity;
- ⇩ Operations/Maintenance costs on four vessels through the mid-life refit period;
- ⇩ Still require peak season capacity to address PRV's.
- ⇩ Operations costs are high especially during periods of over capacity;
- ⇩ Maintenance costs of ownership are high and will escalate with existing fleet.

Option 9 - Replace the Fleet with New ROPAX (3 + 1 Commercial)

This option is the same as Option 7, but with a new "Commercial" ROPAX in lieu of the RORO replacing the Atlantic Freighter. This "Commercial" ROPAX vessel provides increased passenger carrying capacity over a RORO vessel which is limited to 12 passengers, allowing increased tractor trailer traffic since the vessel's passenger capacity would accommodate truck drivers.

This suggested the following assets:

<u>Joseph & Clara Smallwood [ROPAX]</u>
Until 2010

<u>Caribou [ROPAX]</u>
Until 2008

<u>Leif Ericson [ROPAX]</u>
Until 2012

<u>Atlantic Freighter [RORO]</u>
Until 2008

<u>New Vessel 1 [ROPAX]</u>
LOA: 153 m (501ft-11.55in)
PAX: 200
Lane Metres: 1,693 m (5,554ft)
AEU: 317
Speed: 20 knots
Power: 13,159 kW (17,640 BHP)

<u>New Vessel 1, 2 & 3 [ROPAX]</u>
LOA: 175 m (574ft – 1.68in)
PAX: 1,000
Lane Metres: 2,490 m (8,169ft)
AEU: 466
Speed: 24 knots
Power: 28,939 kW (38,792 BHP)

Figure 8 – 154m ROPAX

Option 9

YEAR	AF	RORO	CAR	SML	LE	ROPAX				
		1				1	2	3		
2004	N-P		N-P	N-P-A	N-P				OK	Demand
2005	N-P		N-P	N-P-A	N-P				OK	
2006	N-P		N-P	N-P-A	N-P				OK	
2007	N-P		N-P	N-P-A	N-P				OK	
2008		N-P		N-P-A	N-P	N-P			OK	
2009		N-P		N-P-A	N-P	N-P			OK	
2010		N-P			N-P	N-P	N-P-A		OK	
2011		N-P			N-P	N-P	N-P-A		OK	
2012		N-P				N-P	N-P-A	N-P	OK	
2013		N-P				N-P	N-P-A	N-P	OK	
2014		N-P				N-P	N-P-A	N-P	OK	
2015		N-P				N-P	N-P-A	N-P	OK	
2016		N-P				N-P	N-P-A	N-P	OK	
2017		N-P				N-P	N-P-A	N-P	OK	
2018		N-P				N-P	N-P-A	N-P	OK	
2019		N-P				N-P	N-P-A	N-P	OK	
2020		N-P				N-P	N-P-A	N-P	OK	

Positives to this option

- ✓ Excellent reliability and availability compared to Status Quo;
- ✓ Excellent Maintainability reduces the frequency and duration of planned work periods;
- ✓ Required increase in capacity for all types of traffic;
- ✓ Faster turn around time with bow and stern door configuration;
- ✓ Potentially less overtime for the labour force;
- ✓ Simplified training with a standard ship class.
- ✓ Less schedule congestion;
- ✓ There would be a return from the sale of the Leif, Freighter, Caribou and Smallwood;
- ✓ Existing services in place for all crewmembers, and;
- ✓ Significant reductions in operating expenses.

Negatives to this option

- ⇩ Large capital outlay.

Option 10 - Replace the Fleet with New ROPAX (4 Identical)

This option is the same as Option 9, but with 4 identical ROPAX instead of a new "Commercial" ROPAX. The intention is to provide the maximum fleet flexibility and redundancy. The vessel shown meets the forecasted demand, however a larger vessel may provide additional operational benefits such as improved seakeeping. The vessel shown provides a fair fiscal comparison to the other options.

This suggested the following assets:

<u>Joseph & Clara Smallwood [ROPAX]</u>
Until 2008 (until 2010 on the Argentia route only)

<u>Caribou [ROPAX]</u>
Until 2010

<u>Leif Ericson [ROPAX]</u>
Until 2009

<u>Atlantic Freighter [RORO]</u>
Until 2008

<u>New Vessel 1, 2, 3 & 4 [ROPAX]</u>
LOA: 165 m (541ft – 4.06in)
PAX: 700
Lane Metres: 2,174 m (7,132ft)
AEU: 407
Speed: 23 knots
Power: 24,062 kW (32,255 BHP)

Option 10

YEAR	AF	RORO	CAR	SML	LE	ROPAX			Demand
		1				1	2	3	
2004	N-P		N-P	N-P-A	N-P				OK
2005	N-P		N-P	N-P-A	N-P				OK
2006	N-P		N-P	N-P-A	N-P				OK
2007	N-P		N-P	N-P-A	N-P				OK
2008			N-P	N-P-A	N-P	N-P			OK
2009			N-P	N-A		N-P	N-P		OK
2010				N-A		N-P	N-P	N-P	OK
2011		N-P-A				N-P-A	N-P-A	N-P-A	OK
2012		N-P-A				N-P-A	N-P-A	N-P-A	OK
2013		N-P-A				N-P-A	N-P-A	N-P-A	OK
2014		N-P-A				N-P-A	N-P-A	N-P-A	OK
2015		N-P-A				N-P-A	N-P-A	N-P-A	OK
2016		N-P-A				N-P-A	N-P-A	N-P-A	OK
2017		N-P-A				N-P-A	N-P-A	N-P-A	OK
2018		N-P-A				N-P-A	N-P-A	N-P-A	OK
2019		N-P-A				N-P-A	N-P-A	N-P-A	OK
2020		N-P-A				N-P-A	N-P-A	N-P-A	OK

Note : The Smallwood runs on only the Argentia route in 2009/10

Positives to this option

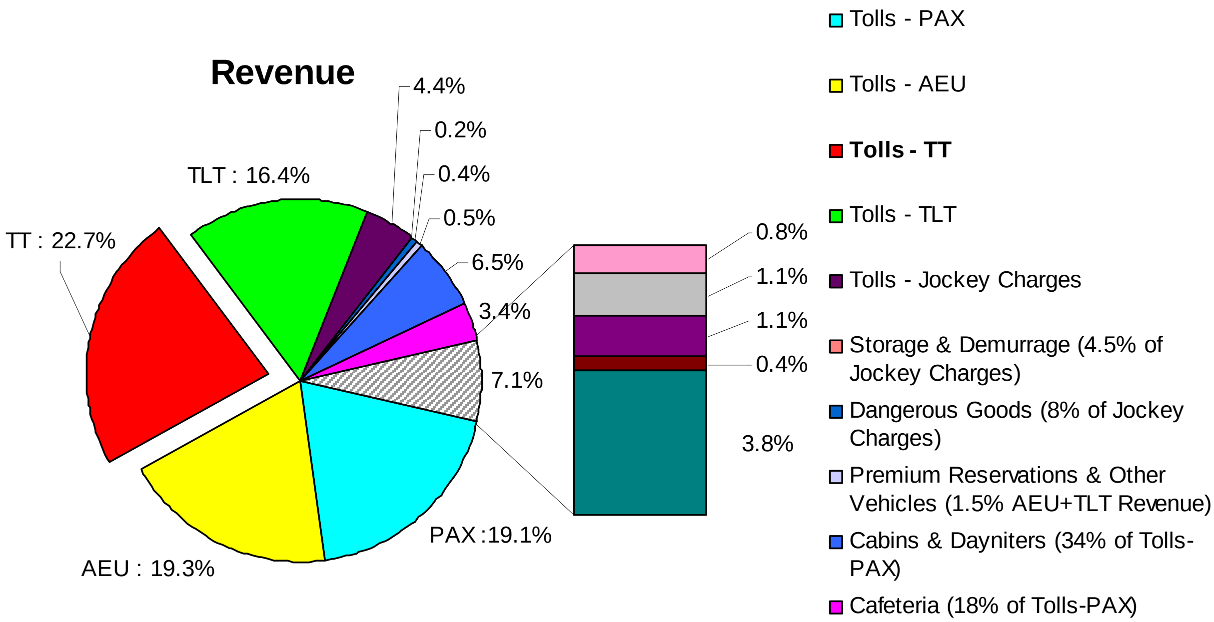
- ✓ Excellent reliability and availability compared to Status Quo;
- ✓ Excellent Maintainability reduces the frequency and duration of planned work periods;
- ✓ Required increase in capacity for all types of traffic;
- ✓ Faster turn around time with bow and stern door configuration;
- ✓ Potentially less overtime for the labour force;
- ✓ Much simplified training with a standard ship class.
- ✓ Enormous scheduling freedom (All ships can sail all routes)
- ✓ There would be a return from the sale of the Leif, Freighter, Caribou and Smallwood;
- ✓ Existing services in place for all crewmembers, and;
- ✓ Significant reductions in operating expenses.

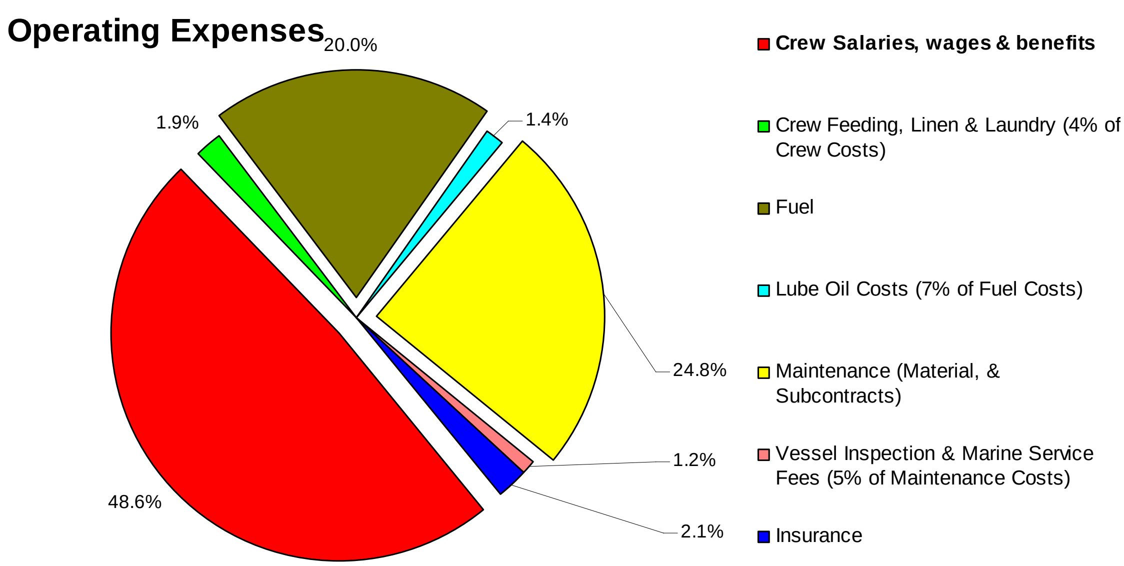
Negatives to this option

- ⇩ Large capital outlay.

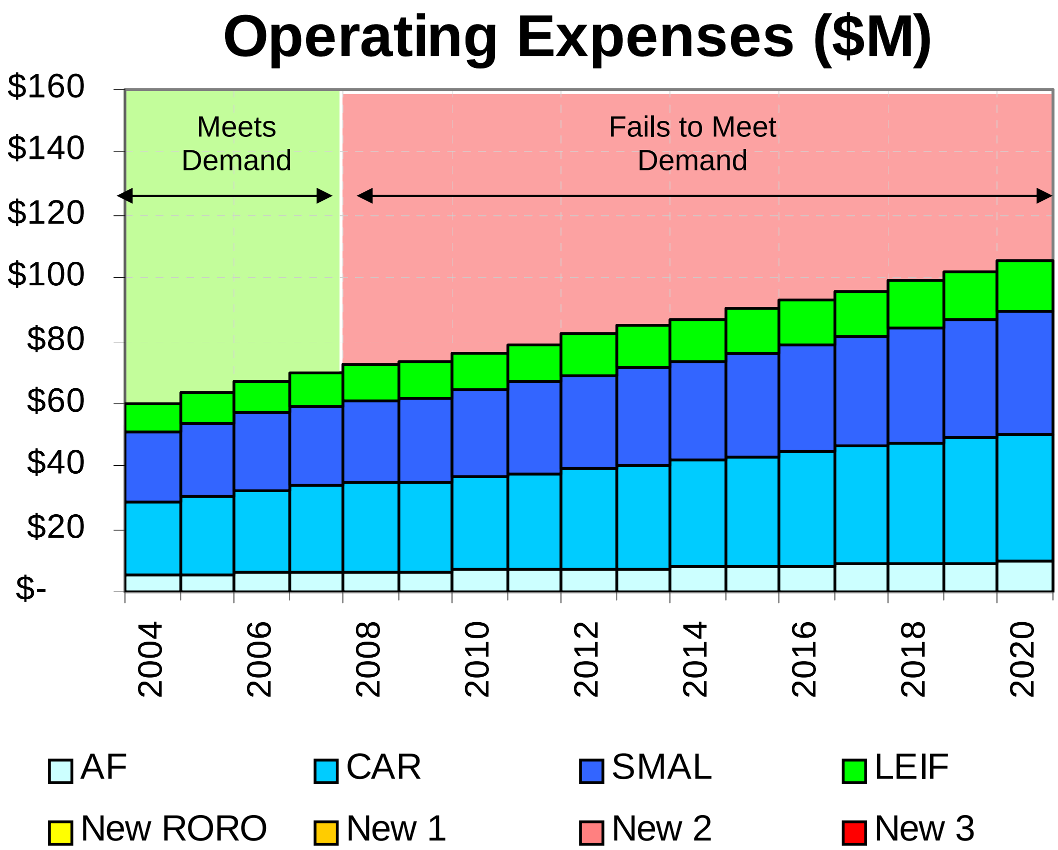
Summary of Options

Cost breakdown for Status Quo

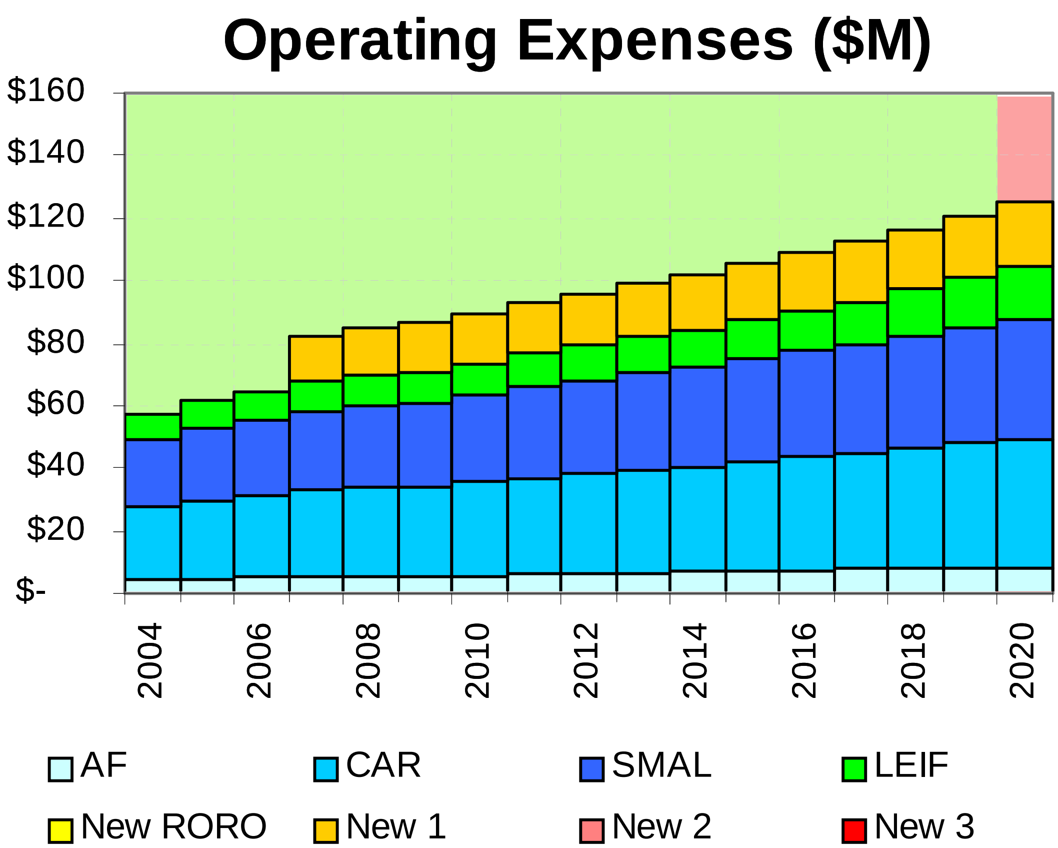




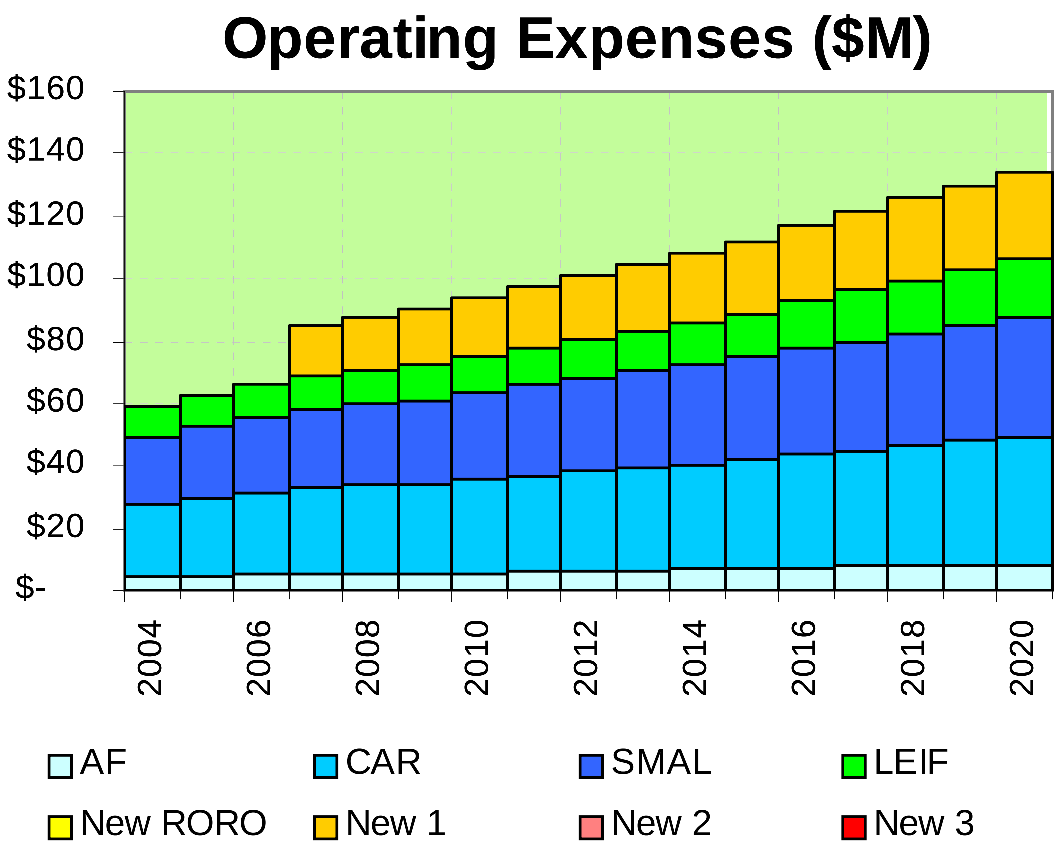
Option 0 Status Quo (SQ)



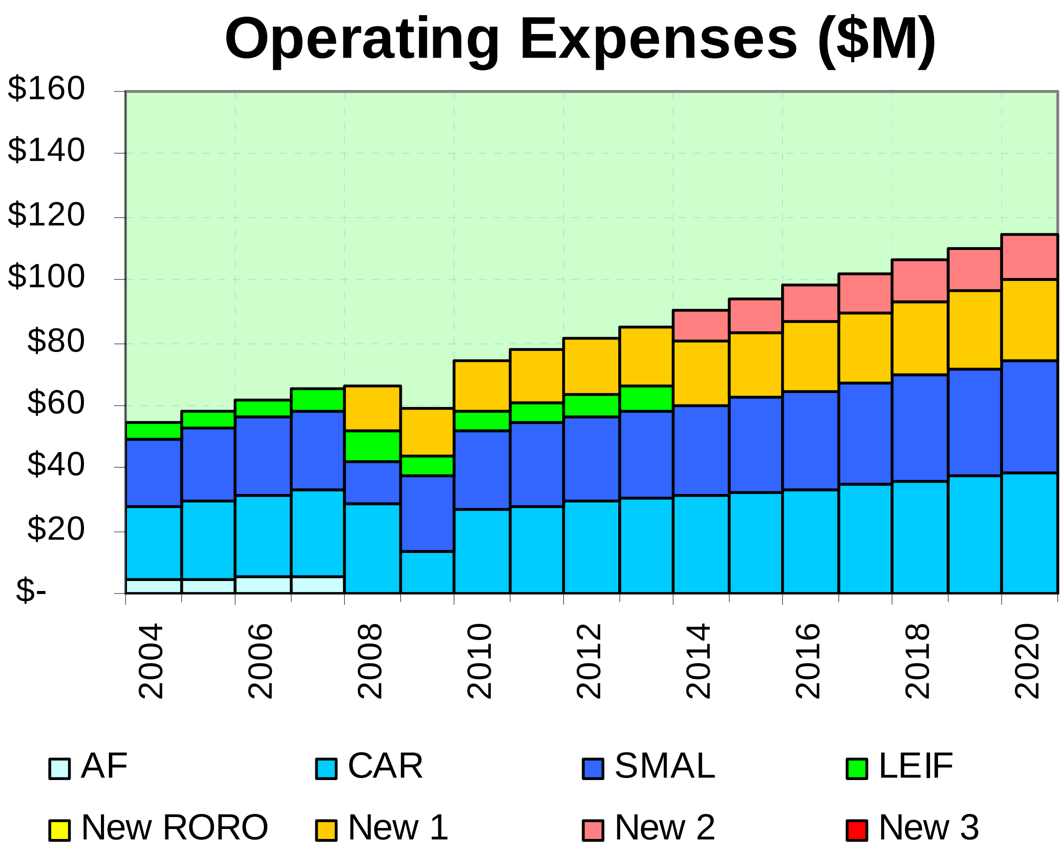
Option 1 Status Quo and Charter a High Speed Craft for the Summer



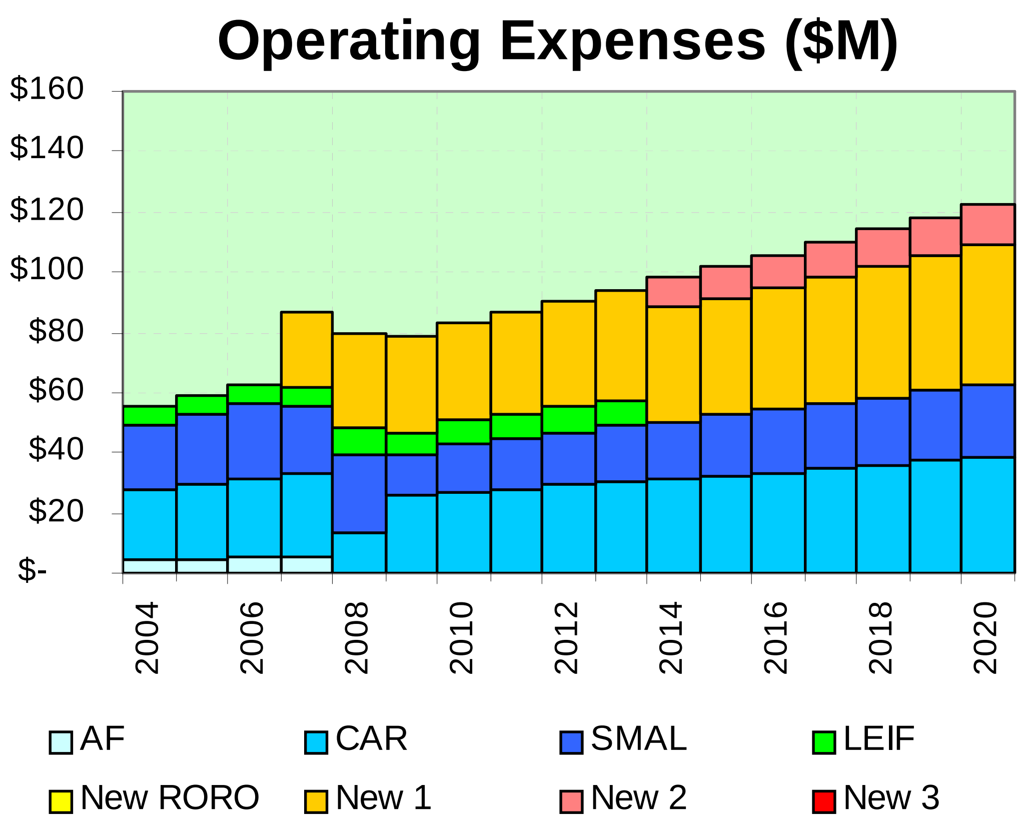
Option 2 Status Quo and Charter ROPAX for the summer



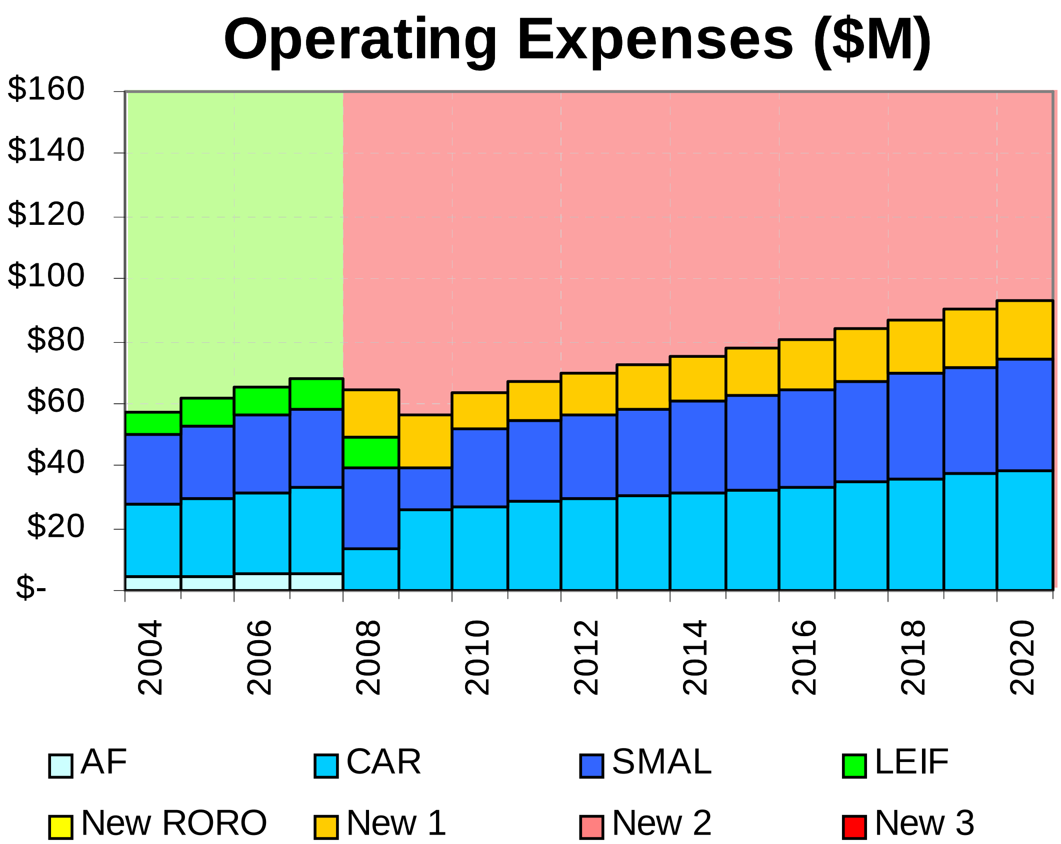
Option 3 Sell Atlantic Freighter and Purchase 1 + 1 new ROPAX



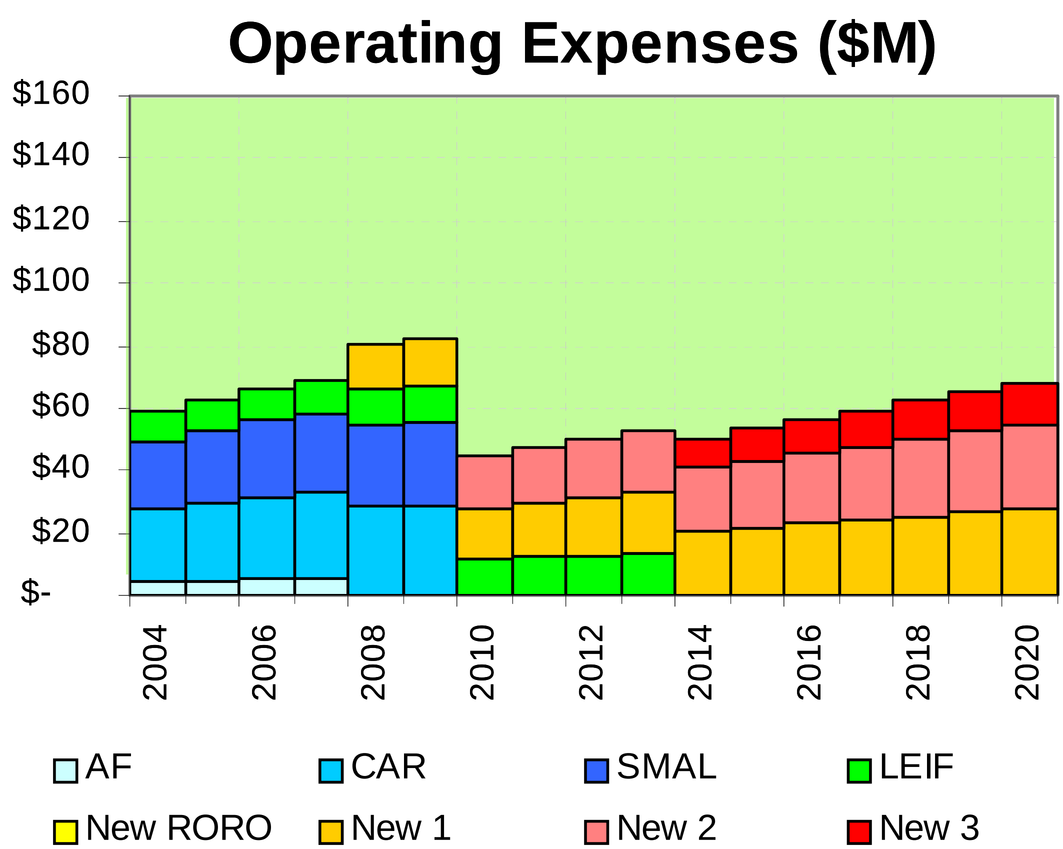
Option 4 Sell Freighter / Charter 1 + 1 New ROPAX



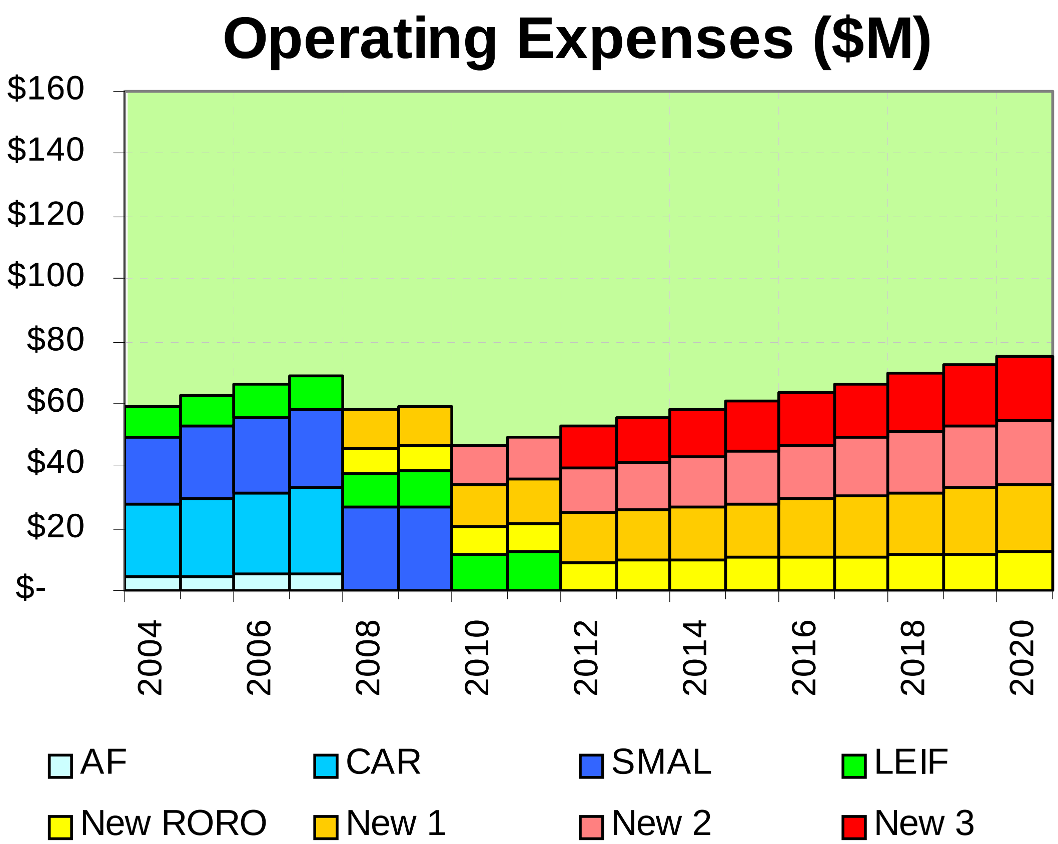
Option 5 Sell Freighter & Leif and buy new Fast ROPAX



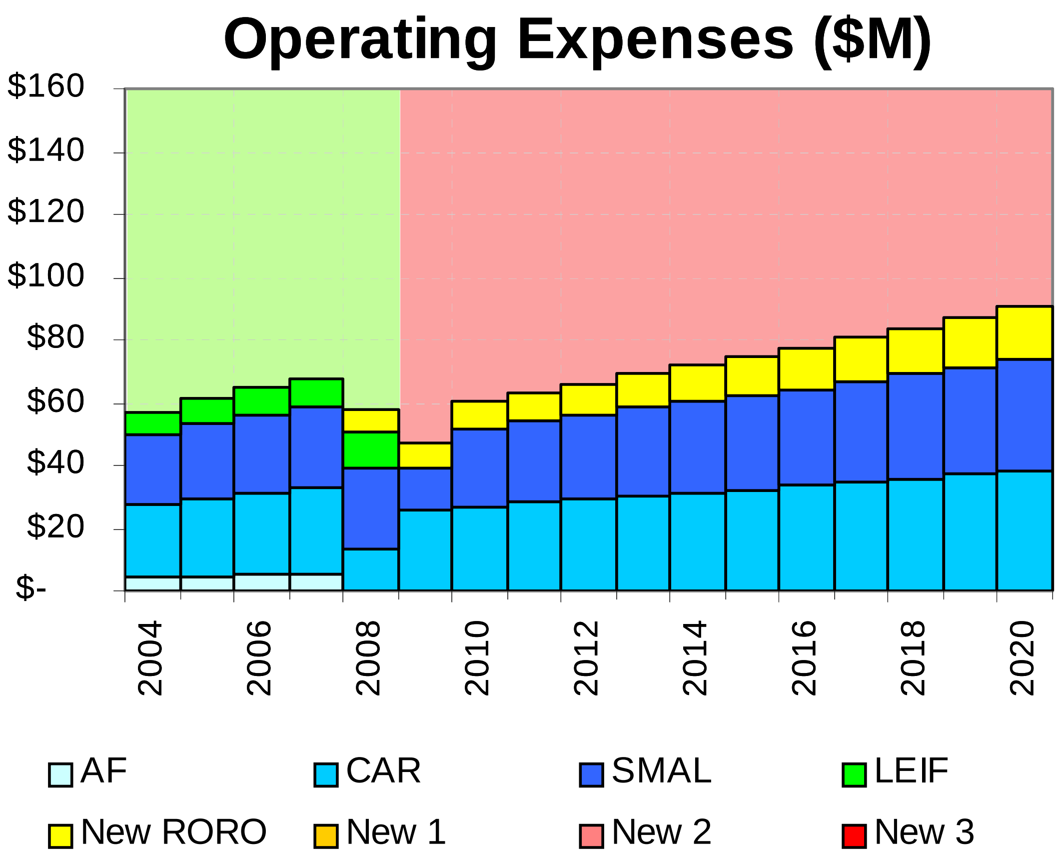
Option 6 Sell Caribou, Smallwood & Freighter and buy 2+1 New ROPAX



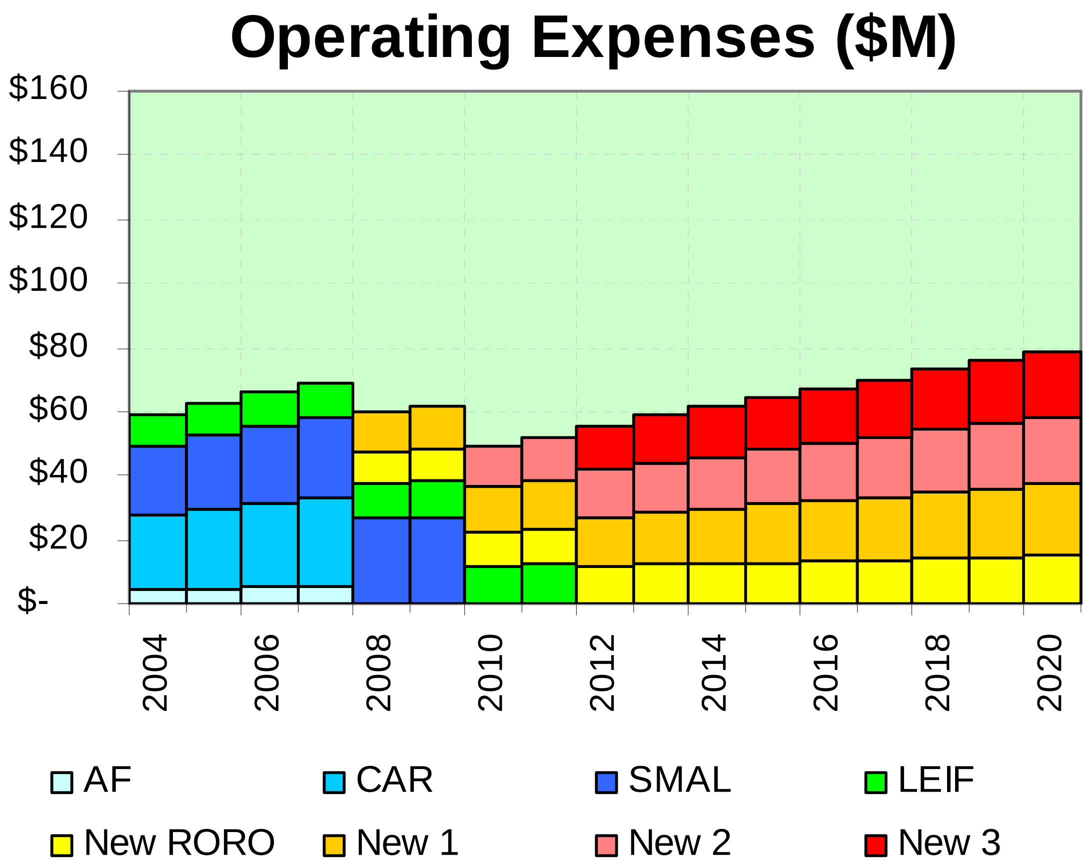
Option 7   Replace the fleet with 1 new RORO and 3 new ROPAX



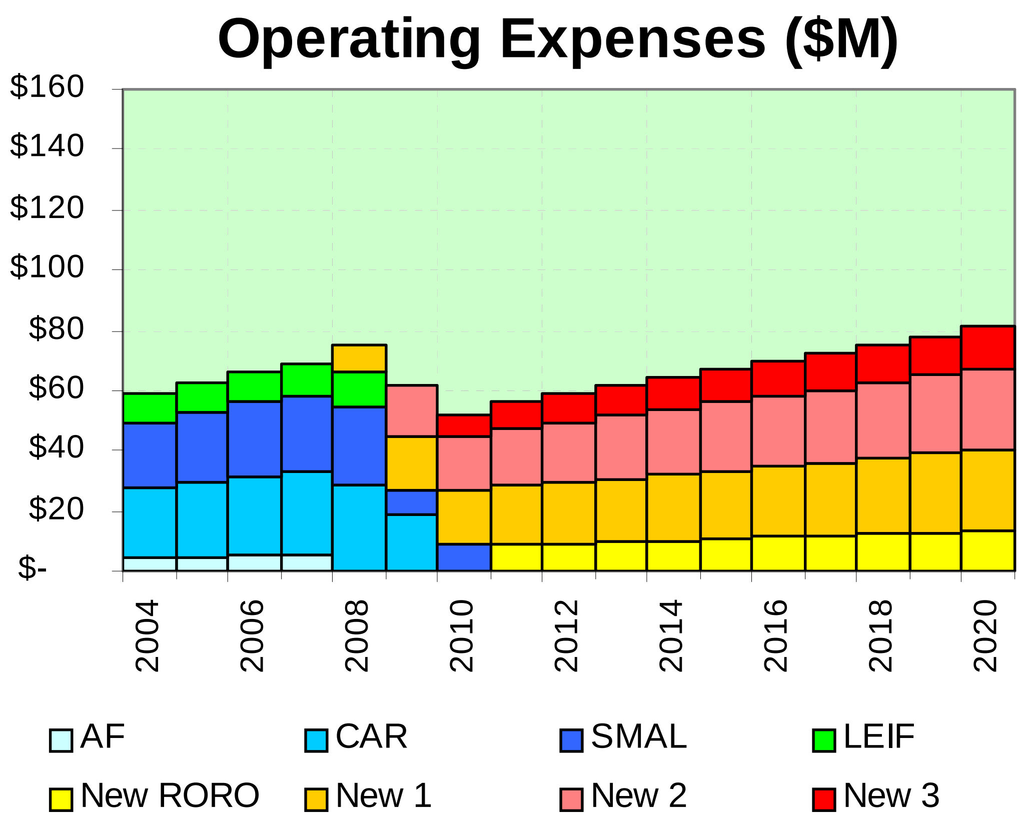
Option 8 Sell Freighter and Leif and Buy New RORO



Option 9 Replace the Fleet with New ROPAX (3+1 Commercial)



Option 10 Replace the Fleet with New ROPAX (4 Identical)



Option Summaries (Scorecard)

In order to simplify the evaluation of the options investigated, three separate summaries have been developed. These reflect a quantitative summary, qualitative summary and operational cost summary. To allow a timeline comparison, values are presented for performance to 2008, 2013, and 2018. Options failing to meet demand are shown highlighted for the period.

Description of each category for Summaries

AEUs per Week: Provides the average demand, capacity, and margin to meet requirements. Capacity shown is corrected for a minimum 15% margin to allow weekly in weekend demand.

CUMM CapX: Reflects cumulative capital expenditures. Options assume all vessel purchase and refit costs, as well a charter fees, to be capital expenditures. Sales reflect monies from the sale of existing vessels. Net capital expenditures is the difference between purchases and sales.

Residual Value: Residual value is the estimated value of the fleet in the year shown. These have been estimated based on acquisition cost, and depreciation based on vessel age.

Cumulative Oper Cost: Reflects cumulative operating costs up to the noted year.

Cumm Cost: Cumulative cost is the sum of net capital expenditures, residual value, and cumulative operating costs.

Average Annual Total Cost: Is the cumulative cost divided by the number of years for the option, starting from 2004.

Note: MAI is encouraged to complete a Failure Modes and Effects Analysis (FMEA) for mission critical systems to determine SOPs to deal with critical failures in a safe and timely manner.

Quantitative Summary

2008

Option	AEUs per Week Note 1			Cumm CapX Note 2			Residual Value	Cumulative Oper Cost	Cumm Cost	Average Annual Total Cost
	Demand	Capacity	Margin	Buy or Charter	Sales	Net CAPX				
0	877	839	-39							
1	877	1107	229	$19	$0	$19	$114	$331	$235	$59
2	877	1248	370	$11	$0	$11	$110	$349	$250	$63
3	877	923	46	$251	$(2)	$249	$245	$303	$308	$77
4	877	910	33	$99	$(2)	$97	$117	$323	$304	$76
5	877	800	-77							
6	877	1081	204	$180	$(2)	$178	$250	$333	$260	$65
7	877	978	101	$208	$(37)	$171	$258	$316	$229	$57
8	877	956	78	$183	$(2)	$181	$195	$308	$294	$74
9	877	979	101	$251	$(37)	$214	$284	$319	$249	$62
10	877	994	117	$118	$(2)	$116	$202	$332	$246	$61

2013

Option	AEUs per Week Note 1			Cumm CapX Note 2			Residual Value	Cumulative Oper Cost	Cumm Cost	Average Annual Total Cost
	Demand	Capacity	Margin	Buy/Charter	Sales	Net CAPX				
0	978	839	-139							
1	978	1107	129	$68	$0	$68	$71	$745	$742	$82
2	978	1248	269	$39	$0	$39	$69	$807	$778	$86
3	978	1054	76	$331	$(2)	$329	$314	$677	$692	$77
4	978	1043	65	$231	$(2)	$229	$204	$705	$730	$81
5	978	693	-285							
6	978	1044	66	$360	$(67)	$293	$396	$605	$502	$56
7	978	1174	196	$467	$(107)	$360	$317	$587	$631	$70
8	978	879	-99							
9	978	1214	236	$510	$(107)	$403	$337	$610	$677	$75
10	978	1176	198	$472	$(107)	$365	$335	$622	$652	$72

2018

Option	AEUs per Week (Note 1)			Cumm CapX (Note 2)			Residual Value	Cumulative Oper Cost	Cumm Cost	Average Annual Total Cost
	Demand	Capacity	Margin	Buy/Charter	Sales	Net CAPX				
0	1079	839	-240							
1	1079	1074	-5							
2	1079	1248	169	$71	$0	$71	$46	$1,360	$1,385	$99
3	1079	1205	126	$486	$(27)	$459	$240	$1,162	$1,380	$99
4	1079	1194	115	$442	$(27)	$415	$151	$1,177	$1,441	$103
5	1079	693	-386							
6	1079	1269	190	$516	$(92)	$424	$324	$886	$986	$70
7	1079	1174	95	$467	$(107)	$360	$265	$901	$997	$71
8	1079	879	-200							
9	1079	1214	135	$510	$(107)	$403	$278	$949	$1,074	$77
10	1079	1176	97	$472	$(107)	$365	$287	$970	$1,048	$75

Description

OPTION 0: Status Quo

OPTION 1: Status Quo and Charter High Speed Craft for the Summer

OPTION 2: Status Quo and Charter ROPAX for the Summer

OPTION 3: Sell Atlantic Freighter and Purchase 1 + 1 New ROPAX

OPTION 4: Sell the Atlantic Freighter / Charter 1 New ROPAX / Buy 1 New ROPAX

OPTION 5: Sell Atlantic Freighter & Leif Ericson and Buy New Fast ROPAX

OPTION 6: Sell Caribou, Smallwood & Freighter and Buy 2+1 New ROPAX

OPTION 7: Replace the Fleet with 1 New RORO and 3 New ROPAX

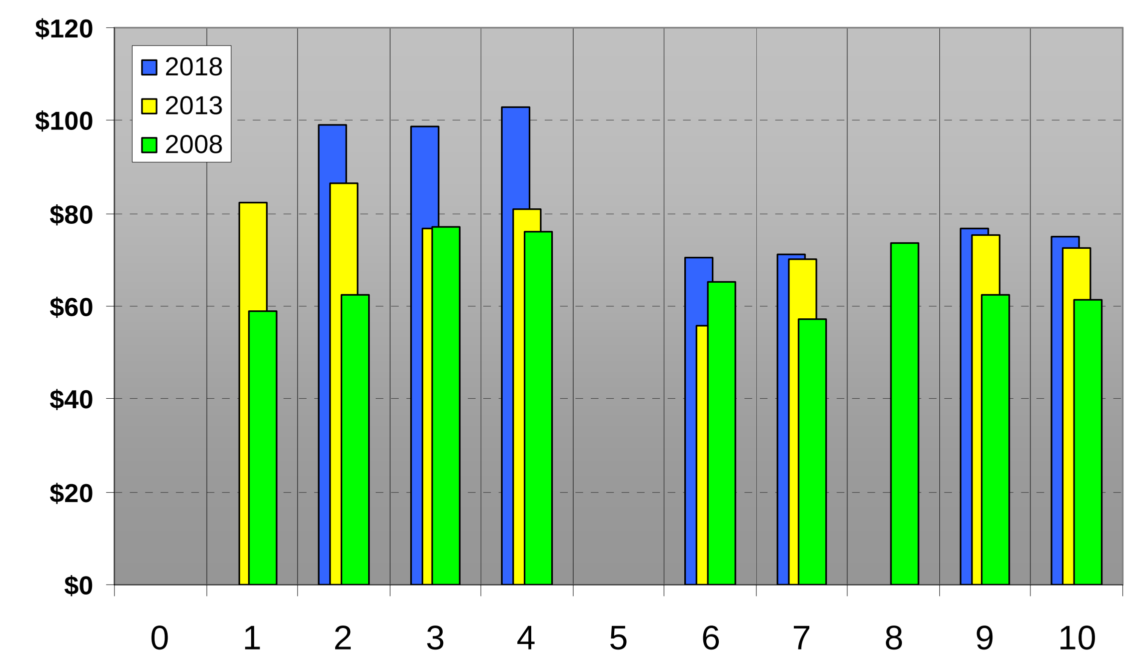
OPTION 8: Sell Atlantic Freighter & Leif Ericson and Buy New RORO

OPTION 9: Replace the Fleet with New ROPAX (3 + 1 comm)

OPTION 10: Replace the Fleet with New ROPAX (4)

Note 1. Capacity taken as 85% of maximum available to cover weekend peaks. AEUs = Average number per week in stated year.
Note 2: CAPX Purchases Include Charter Fees & Midlife Refit Costs
Note 3. All $ values in millions

Score Card Summary



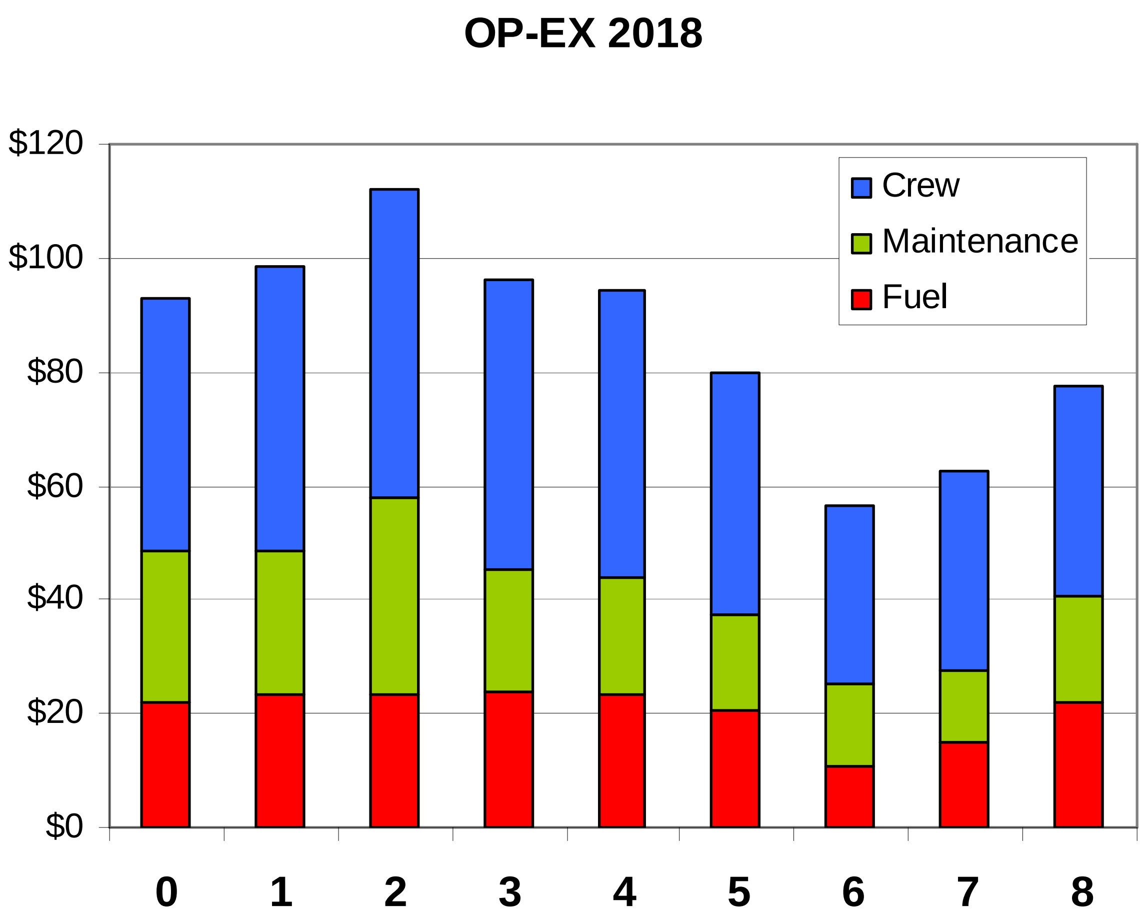
Qualitative Summary (Scorecard)

Option	Cumulative Oper Cost	Average Annual Total Cost	Cumulative Oper Cost	Average Annual Total Cost	Cumulative Oper Cost	Average Annual Total Cost	Qualitative Assessment of Inherent Risks and Benefits
0							*Does not meet demand*
1	$331	$59	$745	$82			*Does not meet demand*
2	$349	$63	$807	$86	$1,360	$99	**Risks** : Aging fleet, dismal RAM, logistics of adding 1 extra ship, extra crew req'd **Benefits** : none
3	$303	$77	$677	$77	$1,162	$99	**Risks** : Aging fleet assets, poor RAM **Benefits** : Atlantic Freighter and Lief Ericson replaced by more efficient vessels
4	$323	$76	$705	$81	$1,177	$103	**Risks** : Aging fleet, poor RAM, difficulty in securing a suitable vessel for a long-term seasonal charter **Benefits** : charter vessel can be brought in to meet immenent demand short-fall
5							*Does not meet demand*
6	$333	$65	$605	$56	$886	$70	**Risks** : no redundancy as 29% of capacity resides in 1 vessel. Remaining fleet will not meet demand in Drop&Go service **Benefits** : meets demand, reduced fleet size, larger vessels will be more sea-kindly
7	$316	$57	$587	$70	$901	$71	**Risks** : none **Benefits** : meets demand, indentical fleet size as in 2004, 3 identical ROPAX vessels + 1 RORO
8	$308	$74					*Does not meet demand*
9	$319	$62	$610	$75	$949	$77	**Risks** : none **Benefits** : meets demand, indentical fleet size as in 2004, 3 identical ROPAX vessels + 1 Comm.ROPAX
10	$332	$61	$622	$72	$970	$75	**Risks** : none **Benefits** : meets demand, indentical fleet size as in 2004, 4 identical ROPAX vessels

Operational Cost Summary

			2008			2013			2018		
	Number of Ships in Fleet in 2020		Operating Costs			Operating Costs			Operating Costs		
Option	RORO	ROPAX	Fuel	Maintenance	Crew	Fuel	Maintenance	Crew	Fuel	Maintenance	Crew
0	1	3	$16	$18	$33	$19	$23	$38	$22	$27	$44
1	1	4	$17	$16	$37	$20	$21	$43	$23	$25	$50
2	1	4	$17	$21	$39	$19	$28	$45	$23	$34	$54
3	0	4	$16	$10	$35	$21	$16	$40	$24	$21	$51
4	0	4	$17	$10	$38	$20	$17	$40	$23	$21	$50
5	0	3	$12	$8	$39	$17	$12	$36	$20	$17	$42
6	0	3	$17	$17	$36	$11	$10	$26	$11	$15	$31
7	1	3	$15	$10	$29	$13	$7	$30	$15	$13	$35
8	1	2	$13	$8	$32	$19	$13	$31	$22	$19	$37
9	0	4	$15	$10	$32	$14	$7	$33	$16	$13	$39
10	0	4	$18	$16	$36	$15	$5	$35	$18	$10	$42

Operational Cost Summary



Conclusions

Strategic modeling and the ensuing analysis provides more than a monetized comparison of fleet renewal options. The process of building the model required Marine Atlantic to bring to light a large amount of historical data that contained the essence of the model results and ultimately these conclusions. The modeling exercise was in fact the vehicle for gathering, culling and analyzing the copious amount of data Marine Atlantic had already accumulated. The information provided by assessing the historical data provided great insight into the issues surrounding the existing fleet. If for no other reason other than this, the Strategic Model has proven its usefulness. Fleetway is confident that the data provided can assist Marine Atlantic in determining the future of the fleet.

The conclusion provides a general discussion on the concepts tested in each option followed by a discussion on the impact of the three underlying noted in the background and finally a discussion on the possible reasons behind the results as presented.

Concepts Tested

Operational Costs: The analysis is interesting in that revenue does not vary annually between options as long as demand is met. When this is juxtaposed with MAI's primary mandate which is to meet the demand, it is obvious that revenue is fixed and all discussion must focus on cost reduction.

High-Speed Craft : Options 1 and 5 investigate the possibility of using speed as a method of improving the capacity and efficiency of the fleet. Neither option shows much merit in this respect. Costs are still high, demand is not met for any significant period and the associated operational risks are high. MAI's previous, unprofitable experience with the Max Mols seems to be quite a good example of what to expect for any future high-speed service.

Charter vs. Buy Options : Options 3 and 4 explore the benefits of charter over purchase for a new ROPAX. Unfortunately, neither option shows much hope of providing MAI a long-term, low-risk solution. The charter option has short-term advantages to MAI in that capacity can be increased without incurring a large debt load. This would suggest that there is a potential benefit in pursuing a charter that must be weighed carefully against the inherent risks.

Top Scorers : The top options are centred on retiring existing assets and acquiring new ones. The benefits can be summarized as : reduced operating costs, improved reliability and availability. There are still some concerns with the operational risks associated with one of these options, Option 6.

The message is a strong one – Marine Atlantic must acquire new tonnage to meet demand and must retire existing tonnage to reduce expenses.

The Three Fundamental Assumptions and their Impact on the Results

To re-cap, the three assumptions were :

- The nature of the traffic demand will require vessels with high lane-metre to passenger ratios (LnM/PAX). This is due to the level of commercial traffic and the low level of passenger traffic for 50% of the year;
- Passenger (PAX) traffic increases will occur during the period mid-June through mid-September, and;
- Commercial tractor trailer (TT) and drop trailer (DT) traffic will continue to increase given the strong economic outlook for Newfoundland and Labrador.

Their impact is as follows :

- **Nature of Traffic** – The make-up of the traffic demand requires large vessels capable of carrying significant cargo weight with relatively small passenger requirements compared to vessels in similar European services. This precludes the efficient use of high speed ferries that primarily focus on the carriage of passengers and light vehicles. It also makes the purchase and/or charter of existing tonnage a difficult proposition as suitable vessels are in very short supply. The speed and turn-around time of the fleet is also critical due to the limited terminal capacity and the volume of vehicle traffic that needs to be processed.
- **PAX Traffic Seasonal Variation** – The high PAX/AEU traffic demand in the summer months (with additional peaks at each weekend) makes it difficult to efficiently tune the fleet for the demand on an annual basis.
- **Traffic Growth Trends** – The predicted growth in traffic demand coupled with MAI's primary mandate to carry the traffic that arrives at the terminals makes a Status Quo option untenable. MAI must either increase the number of vessels in their fleet (Options 1 & 2) or improve the overall fleet efficiency (Options 4, 6, and 7). Other options fail on too many criteria to be considered viable alternatives.

Possible Reasons for the Returned Results

The fleet has evolved over time and adapted to the traffic demand. All of the existing vessels provide an important contribution to meeting this demand. The two least efficient assts are the Leif Ericson and the Atlantic Freighter. Both are less than ideal choices for the route for the following reasons :

- **Leif Ericson** : The vessel is not well suited to meet the rigors of the environment that it needs to operate in. This can best be demonstrated through Marine Atlantic's own reluctance to operate the vessel during the winter, the very time that operating a smaller vessel would make the greatest economic sense in light of the reduced traffic demand.
- **Atlantic Freighter** : The vessel has the capability of providing dedicated service for commercial traffic. Unfortunately due to the slow transit speed and the long terminal times brought on by the stern-only loading geometry of the vessel, the ship has not realized its full potential.

The fleet inefficiencies caused by these two vessels combined with the age of all of the assets paints a relatively easy picture to comprehend. Marine Atlantic may have focused on short-term solutions to long-term problems ultimately placing themselves in a situation where they must make significant changes to the fleet to make any appreciable difference in the current trend of ever-increasing operating costs.

General Observations

The existing fleet is aging resulting in a gradual decline in dependability, increased maintenance costs, downward trend of machinery efficiency and of course, a general lack of new technology that could reduce operational costs.

The service Marine Atlantic is engaged in is unique in the world. The combination of route environment and traffic mix do not match any other service. The closest match is clearly the North Sea and longer Baltic routes. As a result of this, the most efficient vessels in the fleet are vessels that were designed specifically for the route (ie: Caribou & Smallwood). The purchased vessels do not perform as well in terms of Revenue as a percent of Operating Expenses (Rev/OP Exp) as the custom vessels. The purchased vessels also suffer from operational restrictions due to either capacity or capability to function in the given environment.

Vessel	Utilization	Rev/Op Exp
Caribou[1]	80%	175.3%
Smallwood[1]	80%	164.6%
Leif Ericson[2]	80%	143.7%
Option 7 New ROPAX[3]	80%	279.9%

1 : Old North American design
2 : Current European design
3 : Proposed North American design

Recommendations

Marine Atlantic will need to develop corporate strategies similar to successful European operators such as DFDS in Denmark whose target fleet age is between 10 and 20 years depending on the service (http://www.dfdsseaways.co.uk/DFDSGROUP/EN/Presentation/BusinessStrategy/). The financial rational for such a strategy can be seen by studying the Marine Atlantic's Strategic Model results, the proof of its validity is in the success of companies like DFDS.

Fleet renewal needs to be approached from a corporate point of view rather than at a vessel level. This means that instead of looking at the cost/benefits of replacing one vessel with another; Marine Atlantic should focus on what their long-term fleet objectives are and then concentrate on achieving those goals through an aggressive schedule and budget based on facts won through study and analysis not speculation. This will open the possibility of adopting options such as those investigated in Option 7 and will provide new opportunities for scheduling that may not have been previously considered due to the limitations of the existing assets.

Ultimately, Marine Atlantic will need to replace every vessel in their fleet.
This is an indisputable fact.

The only real questions are when and with what.

Glossary

AEU — **A**utomotive **E**quivalent **U**nit. This is a method of relating the carrying capacity of cargo deck space to standardized vehicles. Typically 5.34m long by 2.5m wide. It is important to recognize that the AEU is a theoretical unit based loosely on a Volkswagen Golf. The AEU accounts for the fact that passenger vehicles (PRV's) can be stowed closer together than commercial vehicles (CRV's) as they are narrower. Deck markings and Standard Operating Procedures (SOP's) need to reflect this in order to truly capitalize on the higher stowage rate as commercial vehicles require a minimum 3.0m of lane width.

AF — M.V. **A**tlantic **F**reighter

ARG — **Arg**entia, Newfoundland

CAR — M.V. **Car**ibou

CRV — Commercial Vehicle

DT — **D**rop **T**railer. The trailer portion is dropped off at the departure terminal. The carrier (Marine Atlantic) moves the DT onto the vessel using Yarding Tractors; small very manoeuvrable trucks fitted with hydraulic fifth wheels. Upon arrival other Yarding Tractors unload the vessel to the marshalling yard where they await pick-up. Typically 15.24 m. long.

DWT — **D**ead**w**eigh**t**. Displacement - Lightship = Deadweight The portion of the vessels total weight (Displacement) that is made up of everything not part of the vessel itself (Lightship). This includes all the liquid in the tanks, vehicles, passengers, crew, provisions, spares, etc.

FMEA — **F**ailure **M**odes and **E**ffects **A**nalysis. An analytical process used extensively in other transportation industries, the offshore industry and the military. The process involves tracking the effects of a point failure through a particular system to determine any critical failure points.

HSC — **H**igh **S**peed **C**raft. Generally, any vessel operating in the 25-28 knot range and higher. These vessels are characterized by large, sophisticated propulsion machinery installations and extremely light construction, often in aluminium. Speed and comfort in a rough seas are mutually incompatible and as such this type of vessel is either very large (+120m LOA) or limited to sheltered routes.

kW — Kilowatt. One thousand watts. Metric unit of measure for power.
BHP x 0.746 = kW

Link-Span — The shore ramps that link the vehicle decks with the terminal. The ramps are adjustable to account for changes in tide and vessel draft.

LnM	**L**a**n**e **M**etres. Unit of measure for vehicle decks. Lane-metres are always measured on standard 2.50 m. lane widths.
LE	M.V. **L**eif **E**ricson
LOA	**L**ength **O**ver **A**ll. Refers to the maximum length of a vessel in its normal operating configuration.
MAI	**M**arine **A**tlantic **I**ncorporated
NS	**N**orth **S**ydney, Nova Scotia
PAB	**P**ort **A**ux **B**asques, Newfoundland
PAX	Passenger(s). Used across travel industry, origin unknown.
PRV	Passenger Vehicle
PWP	**P**lanned **W**ork **P**eriod. Vessels are removed from service during periods of reduced demand to facilitate maintenance and repair. This differs from refits in terms of the scope of the work carried out and the time frame of the work.
RAM	**R**eliability, **A**vailability**, M**aintainability. The basic concepts used to describe the ability of a system or vessel to meet its design objectives through its service life.
ROPAX	**R**oll **O**n **PAX**. This acronym is used for commercial vessels that load cargo over stern and/or bow ramps. They carry a large number of passengers, usually based on the number of AEU's the vessel can carry plus an allowance for walk-on traffic. The vessels range from day ferries with no dining facilities or overnight accommodations to cruise ferries that have a full complement of services.
RORO	**R**oll **O**n **R**oll **O**ff. This acronym is used for commercial vessels that load cargo over stern ramps. Traffic is backed on and driven off. They are limited to a maximum of 12 passengers by Transport Canada. Higher loading/discharge efficiency can be achieved by using bow and stern ramps which allows the traffic to drive on and drive off. Occasionally referred to as a PCTC : Pure Car Truck Carrier or PCC : Pure Car Carrier if the load type is specialized.
SML	M.V. Joseph & Clara Smallwood
SOP	**S**tandard **O**perating **P**rocedure. The rules that govern the operational aspects of everything from ticketing to emergency procedures. The SOP's contain the decision matrix for efficiently and safely operating the fleet in a consistent manner.
TT	**T**ractor **T**railers. Highway semi-trailer units. They can be up to 24.4m long and require 3.00 m. of lane width. Typically 21.24m. long.

ANNEX A

A Review of Existing Asset Features

Vessel features found to directly and/or indirectly affect the fiscal performance of the fleet have been noted below for information :

- Capacity to load/unload off of the high and low level link-span (shore ramp) simultaneously
- Internal ramp(s) to facilitate loading the upper vehicle deck in Argentia
- Drive-on Drive off capability to reduce loading time
- Sufficient displacement and stability to carry an all commercial vehicle load on both vehicle decks

- Ice strengthening of hull and all appendages
- Good seakeeping qualities (passenger comfort criteria)
- Ability to back into an ice infested terminal without damaging appendages
- Ability to occasionally negotiate heavy 100% ice cover when entering the harbour
- Adequately sized bow/stern thrusters to manoeuvre in Port Aux Basques

- Simple, robust, easily maintained systems
- Redundancy in service critical systems (ex: propulsion, thrusters, water, heating, etc)

- Adequate seating for the entire PAX capacity.
- Unadorned dining and snack facilities
- Comfortable and robust seating with additional space for carry-on bags
- Unadorned, yet comfortable passenger cabins
- Video (movie) lounges
- “Rent-a-bunk” facilities
- In service information systems (ex: PA & info screens) that include special needs passengers.

Full regulatory compliance has been assumed as a prerequisite and has not been further addressed in this list.

ANNEX B

Crewing and Maintenance Approach and Assumptions

Maintenance Costs

The maintenance module for the Strategic Fleet Model uses historical fleet maintenance costs provided by Marine Atlantic for each vessel for the period from 1995 through September 2004 to develop maintenance cost predictions for the fleet. Maintenance costs provided by Marine Atlantic (MA) were sorted and broken down into two main categories, Operations (OPS) Maintenance, and Passenger (PAX) Maintenance. MA costs provided included MA labour, and these costs were retained throughout the development of maintenance cost predictions.

The intent of the strategic model is to develop a model which can reasonably predict costs for comparative purposes. To this end, it is not intended that the model accurately predict costs in any particular year. Instead, the intent is to predict as best as possible, the maintenance costs over the life of the evaluation. The model has therefore utilized the best fit through maintenance costs for the existing fleet based on historical data. Note that since the Leif Ericson did not have a sufficient number of years of historical data available for maintenance given its recent acquisition, values for the Leif were not considered when developing prediction curves.

To ensure a reasonable approximation of actual maintenance costs a comparison was made between overall (OPS+PAX) predicted costs over the period 1995 through 2004 versus actual maintenance costs provided for the fleet. These comparisons indicated differences between actual and projected maintenance costs over the period of within -6% for the Atlantic Freighter, +1% for the Caribou, -21% for the Joseph and Clara Smallwood, and -64% for the Leif Ericson. Ignoring the Leif, given the lack of data, and combining the fleet, the difference becomes less that -9% between predicted costs and actual costs, with predicted costs less than actual costs. The predictive costs were therefore considered reasonable and realistic, given the higher that normal maintenance costs experienced on the Smallwood, and given the lack of data for the Leif, and cyclical nature of maintenance costs.

The data provided by Marine Atlantic for maintenance costs incorporated inflation over the years evaluated, as well as the cost of Marine Atlantic crews involved in maintenance activities. To this end, inflation factors have not been applied to maintenance as they were for other costs, and predicted crew costs from the crewing module were subtracted from maintenance costs to avoid double accounting for these. Maintenance costs shown in the Financial Summaries therefore exclude and crew costs associated with maintenance activities. These are included under crew costs.

Maintenance Days

Other factors contributing to maintenance costs, is the number of days spent in maintenance, refit, Planned Work Periods (PWPs), or 24-48 hour maintenance layup, since each of these has an impact on crew costs. After evaluating the number of days spent in each activity historically, and comparing these to maintenance costs, the following approach was developed.

- The number of days spent on maintenance in a year is proportional to the amount of dollars spent in the same year, and is estimated based on historical data

- The number of days spent in PWP, refit, or 24-48 hour maintenance layup is based on average historical data, and applied to the number of total days in maintenance estimated per year

- The number of days in maintenance annually cannot exceed time available after operational days are considered

The total number of maintenance days per year is predicted based on an evaluation of historical data, and taken as 0.001% of the maintenance dollars spent in a given year, but not more than 30 days per year. Of the total days of maintenance per year, 25% is assumed for PWPs, 33% for Refits, and 42% for regular and corrective maintenance. The number of days in each activity is used by the Crew Cost module to calculate annual crew costs.

Crew Size (Manning)

Predicted manning is based on Marine Atlantic historical manning data as provided. This data was broken down into five manning categories, Senior Deck, Junior Deck, Senior Engine Room, Junior Engine Room and Commissary Crew. Manning rates are taken as the same for winter and summer for Deck and Engine Room Crews, whereas winter Commissary Crew is taken as 50% of the summer crew to account for the reduced number of passengers carried in the low season.

For each of these categories, the manning module predicts the number of crew required for a vessel based on historical data, and vessel size as represented by the passenger capacity for a ROPAX vessel. RORO manning is considered constant for 12 or less passengers for the size of vessels investigated. Each category has a core, fixed number of crew for all vessels irrespective of size or type (RORO or ROPAX), which represent the Senior Deck (3) and Senior Engine Room (3) crew. Commissary core crew is taken as three (3) for a RORO vessel, and seven (7) for ROPAX vessels. The number of Junior Deck, Junior Engine Room, and Commissary crew varies with vessel type as shown in Figure 1 below.

		RO/RO	Number of Passengers RO/PAX			
Summer Crew		0-12 0	12-250 13	251-500 251	501-1000 501	1000-1500 1001
Senior :	3.0	3	3	3	3	3
ABs :	15.0	9	11	13	14	15
Deck Total:	18.0	12	14	16	17	18
Senior :	3.0	3	3	3	3	3
Junior :	18.0	10	12	14	16	18
Engineering Total:	21.0	13	15	17	19	21
Core:	7.0	3	7	7	7	7
Nominal :	54.0	1	12	28	34	54
Commissary Total:	61.0	4	19	35	41	61
Commissary Base:	29.0	1	10	15	17	22
Total Crew :	**100.0**	29	48	68	77	100

Figure 1 – Manning Rates by Vessel Type & Capacity (Showing Pred Crew for Caribou)

The commissary Base Crew value noted in Figure 1 is calculated for use by the Crew Cost Module for predicting manning rates when a vessel is in maintenance. For these scenarios, Marine Atlantic historical data was analysed for each vessel by vessel operation to determine the weighted cost of personnel for each operation as a percentage of crew costs for normal (base) operations with minimal passengers aboard. Figure 2 shows the percentage of normal (base) operating costs predicted for each vessel operation for Deck and Engine Room Crew, and for Commissary Crew.

2004 Layup / Standby / Maintenance Deck & Engine Room Crew Costs as % Base Operating

Operation	RO/RO	RO/PAX
Normal Operating	100%	100%
Operating Standby (12-24 hr)	36%	62%
Layup	30%	30%
Maintenance (Refit)	106%	113%
Maintenance (PWP)	122%	137%
Maintenance (36-48 hr Layup)	28%	43%
Maintenance (Startup/Shutdown)	93%	0%

2004 Layup / Standby / Maintenance Commissary Crew Costs as % Base Operating

Operation	RO/RO	RO/PAX
Normal Operating	100%	100%
Operating Standby (12-48 hr)	33%	33%
Layup	25%	35%
Maintenance (Refit)	72%	72%
Maintenance (PWP)	121%	93%
Maintenance (36-48 hr Layup)	33%	33%
Maintenance (Startup/Shutdown)	80%	0%

Figure 2 – Crew Cost as a Percent of Normal Operating by Operation

Crew Costs

Crew costs are calculated based on weighted average dayrates for crew members based on 2004 Marine Atlantic rates as provided. These are grouped into the previously noted five (5) categories for Senior and Junior Deck, Senior and Junior Engine Room, and Commissary Crew, and reflect the following.

2004 Crew Costs per Day Including Burden

Crew Category Group	RO/RO	RO/PAX
Snr Dk Weighted Average	$621	$621
Junior Deck Weighted Average	$339	$339
Snr ER Weighted Average	$564	$564
Junior ER Weighted Average	$368	$368
Commissary Weighted Avg	$344	$344

Figure 3 – Weighted Average Crew Dayrates by Category

Crew costs are calculated based on the dayrates of Figure 3 multiplied by the crew costs per operation noted in Figure 2, the number of crew in each category in Figure 1, and the number of days predicted for each operation.

The crew module calculates these costs based on the number of days for each category as follows.

Normal Operating Days (Summer)	From Demand Module
Normal Operating Days (Winter)	From Demand Module
Layup Days	*See text below*
Operating Standby Days	*See text below*
Maintenance (Refit)	33% of total maintenance days
Maintenance (PWP)	25% of total maintenance days
Maintenance (36-48hr Layup)	42% of total maintenance days
Maintenance (Startup/Shutdown)	2 days per Layup

Where the sum of the layup days and operating standby days is 30 or less, the vessel is considered on operating standby for the full period. If the sum of the days exceeds 30 days, the vessel is considered to be in layup for the full period, and 2 days are allotted for each layup for startup / shutdown.

Since all crew costs are calculated based on 2004 crew dayrates, follow-on years include the impact of inflation as input in the Global Data Module.

A comparison of dayrates for predicted manning and crew costs combined for all vessels in the current fleet indicates that the difference is less than 8% for the Atlantic Freighter, and less than 4% for the three ROPAX vessels.

To ensure realistic crewing costs, further comparisons have been made between Marine Atlantic actual crew dayrates for different operations compared to those used in the model. Results indicate that although the mix of crew and total number of crew predicted by the Strategic Model differed slightly from actual Marine Atlantic values, that the overall differences between the model and actual costs were less than 3%. It should be noted that this difference is based on using the same number of days operating, in refit, PWP, or in layup as used in the model. Since it can safely be assumed that for a given set of demand values, the fleet should operate the same number of days, using the most efficient mix of vessels, the only other important variable on crewing cost will reflect the mix of days remaining after operational days (i.e. days in refit & maintenance, layup, etc). This impact has also been evaluated and deemed to represent less than 8% of overall crew costs on the Atlantic Freighter, and less than 5% on the remaining three vessels in the fleet.

ANNEX C

General Assumptions

Assumptions by Module

Time Module:

- Shore facilities are fixed meaning the number of ramps and the numbers of lanes per ramp are fixed at 2.
- Load rates are based on empirical data.
- Fuel capacity to be confirmed.
- All Times are base on Normal operating conditions and do not take into account extreme weather or any other mishaps.
- Transit times are broken down into legs (Harbour, Leg1/Leg3 in/out of Harbour, Leg 2 Transit).
- The Transit time is simply the ships speed multiplied by the distance between PAB and NS.
- Leg 1 and Leg 3 are from the point the vessel makes its approach into the Harbour to where it starts manoeuvring with thrusters. The speed and distance estimated for this Leg is half the ships speed with a distance of 1.5 Nm. The time it takes to complete the leg when calculated this way corresponds well to the values provided by Marine Atlantic.
- The Harbour portion of the time cycle is not base on speed and distance it is given directly as time based on a time factor. This time Factor is derived from the ship's Manoeuvrability and the harbour in which it has to manoeuvre.
- The Manoeuvring time factor is calculated using a decision matrix, a qualitative value of fast, average or slow is all that is required as input to determine the time factor.
- The Manoeuvring time estimated by the model matches the times provide by Marine Atlantic.
- Ultimately having this manoeuvring scale allows for slight changes in the vessels capability which will have a direct impact on cost of the vessel and it ability to generate revenue.

Crew Module:

- The number of Deck and Engineering crew do not change from winter to summer
- The module assumes a crew complement based on passengers at full capacity.
- Values for crew requirements are derived form historical data.

Size Module:

- The values for the size module are based on the input values of LOA, BOA and Speed. Lane Meters, Deadweight, Displacement and Gross Tonnage are then derived from historical data.

Fuel/Power Module:

- The fuel module assumes three basic consumers main engine, Gensets and Boilers.
- Values for the *sfc* (Specific Fuel Consumption) is based on empirical data.
- MCR's is estimated and based on good ship's practice.
- Age and Efficiency of the main engine is estimated and based on good ship's practice.

Insurance Cost Module:

- Charter vessel insurance for Hull & Machinery (H&M), Increased Value (IV), Replacement Tonnage (RT), and War Risks are assumed to be carried by the vessel's owner, and included in the charter costs. Only Protection & Indemnity (P&I) insurance is included in insurance costs for charters. This is calculated based on vessel GRT
- Insurance costs are calculated for 2004 based on current Marine Atlantic Rates, and based on age for insured value, and GRT for RT and P&I, and are adjusted for follow-on years based on inflation, annually reduced insured value, and annually increased RT rates
- Where a vessel undergoes a refit, the cost of the refit is added to the insured value and the rate used is based on the current age of the vessel, less the years of "rejuvenation" obtained from the refit (IO input). This affects H&M insurance, as well as IV. RT is based on GRT and is only affected by annual rate changes

Crew Cost Module:

- Deck and engine crew rates are based on individual dayrates averaged by group for senior and junior personnel. Commissary personnel are averaged for all individual categories. Users may change individual rates in the Global Controls Module and averages will be recalculated
- Dayrates for crew costs for each vessel are based on manning obtained from the crew module (see above) for normal operations. Dayrates for other periods, such as refits, standby, PWP, etc. are based on weighted average percentages of normal operating determined from Marine Atlantic manning data for each type of vessel. Different costs are used in summer and winter, with winter assuming a 50% reduction in commissary crew costs over that for the summer. Deck and engine crew are assumed to remain the same all year.
- Crew costs are calculated based on the number of days for each operation, and the daily crew cost for that operation
- The number of normal operating days is obtained from the IO module for each season. Maintenance days are obtained from the Maintenance Cost Model. Where the number of days remaining after operations and maintenance is less than 30, the vessel is assumed to remain on standby. If greater or equal to 30 days, the vessel is assumed to be laid-up while not operating or in maintenance

Depreciation & Finance Module:

- Depreciation is calculated as 5% per year straight-line starting in the year the ship is acquired using the purchase price
- Financing costs are based on annual payments only, and ignore interest savings from monthly payments. Interest rates are assumed fixed for the amortization period of the loan
- Acquisition or refit cost amounts not financed are assumed as capital expenditures in the year they occur

- Vessel sales are considered negative capital costs in the year of sale, and have not been applied to reduce debt (loan balance when capital expenditures are financed), but are accounted for in the net capital expenditures used in the scorecard
- Shoreside costs have not been considered. Only direct vessel costs.
- Revenues for ancillary services are assumed to be a percentage of the services they support, as noted in the Global Data Module. Similarly, expenses associated with this revenue is considered to be a percentage of the revenue, as calculated from average annual historical costs obtained from Marine Atlantic.

Demand Allocator (DA) Module:

- The summer service factor is not to be greater than 95% in summer and 90% in winter (per Marine Atlantic Instruction)
- Demand must be met for the model to return comparative cost/revenue data.
- The passenger capacity in the winter is assumed to be 50% of that in summer (see also crew cost module)
- The utilization factor is calculated based on demand, and fleet capacity, and assumes that TLTs (Tractorless Trailers) are carried by any ROROs with loads equally distributed on all ROROs in the fleet. If TLT demand exceeds RORO capacity, overflow is evenly distributed over remaining ROPAX vessels
- ROROs cannot carry TTs (Tractor Trailers) or AEQs (Automobile Equivalent Units – Passenger Vehicles) due to a limit of 12 passengers on the vessels
- TT, AEQ, and PAX (Passenger) traffic is equally distributed over all ROPAX vessels operating
- The split of PRVs (Passenger Related Vehicles), TTs and TLTs as used to calculate revenue is based on the demand data given in the Global Data Module
- Atlantic Freighter LnM capacity is based on using only the main and upper decks, reducing capacity from 1,650 to 1,350 LnM based on Marine Atlantic Operations
- Lane Meter and Passenger Capacity are considered to be exceeded when Demand is within 15% of max Capacity.

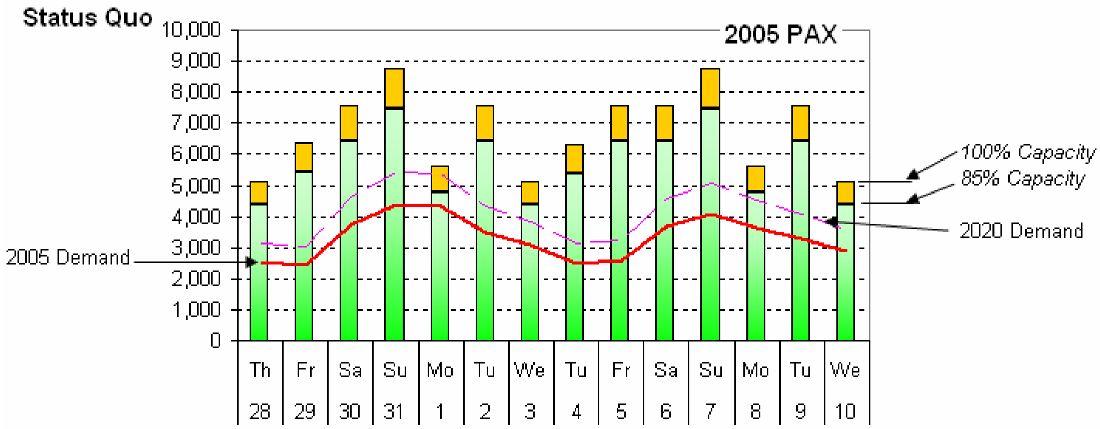
Maintenance Cost Model:

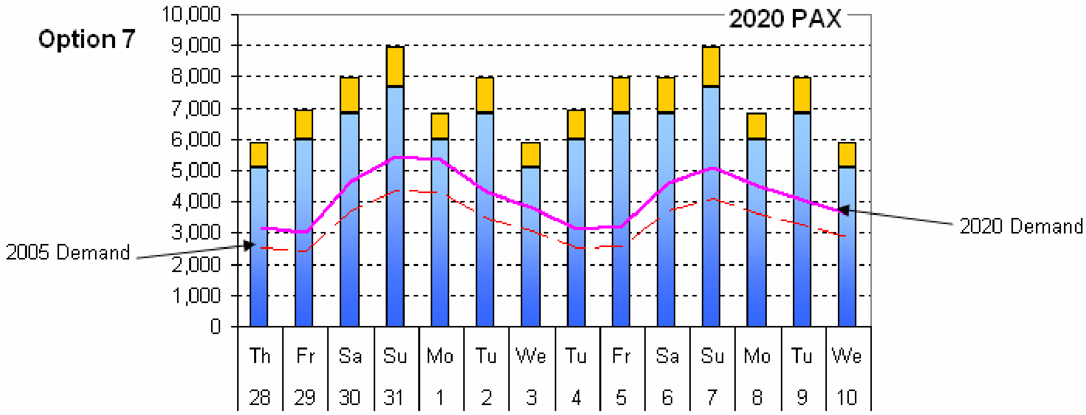
- Annual maintenance cost has been developed based on historical data, and incorporates inflation. Inflation has therefore not been applied to these costs
- Annual maintenance costs are directly proportional to vessel age and GRT
- Number of days spent on maintenance in a year is proportional to the amount of dollars spent in the same year, and is estimated based on historical data
- The number of days spent in PWP, refit, or 24-48 hour maintenance layup is based on average historical data, and applied to the number of total days in maintenance estimated per year
- The number of days in maintenance annually cannot exceed time available after operational days are considered

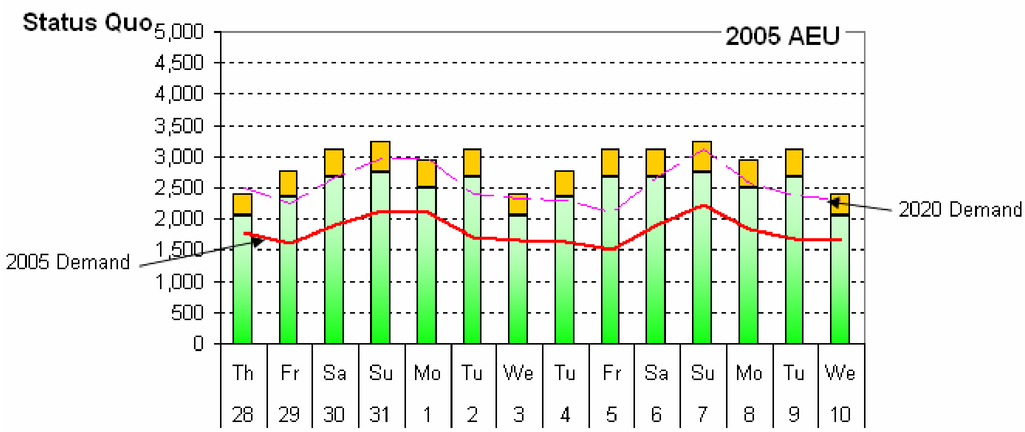
ANNEX D

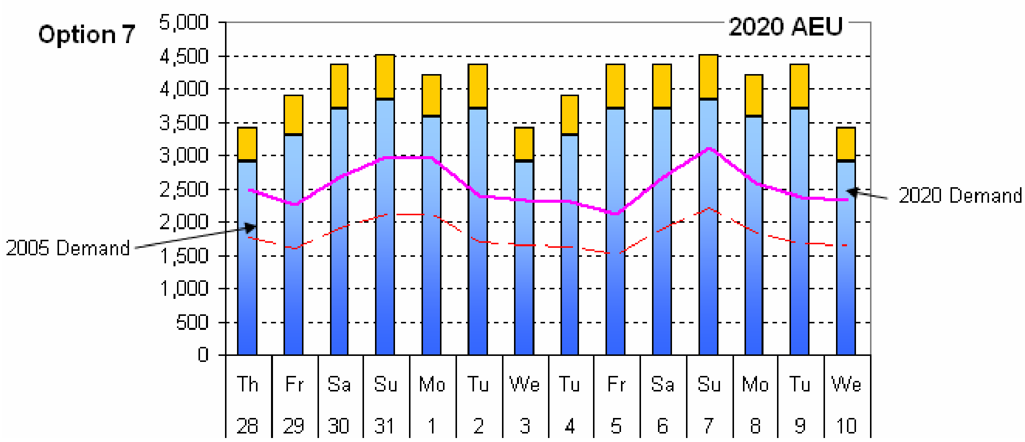
Peak Capacity Check

North Sydney to Port Aux Basque

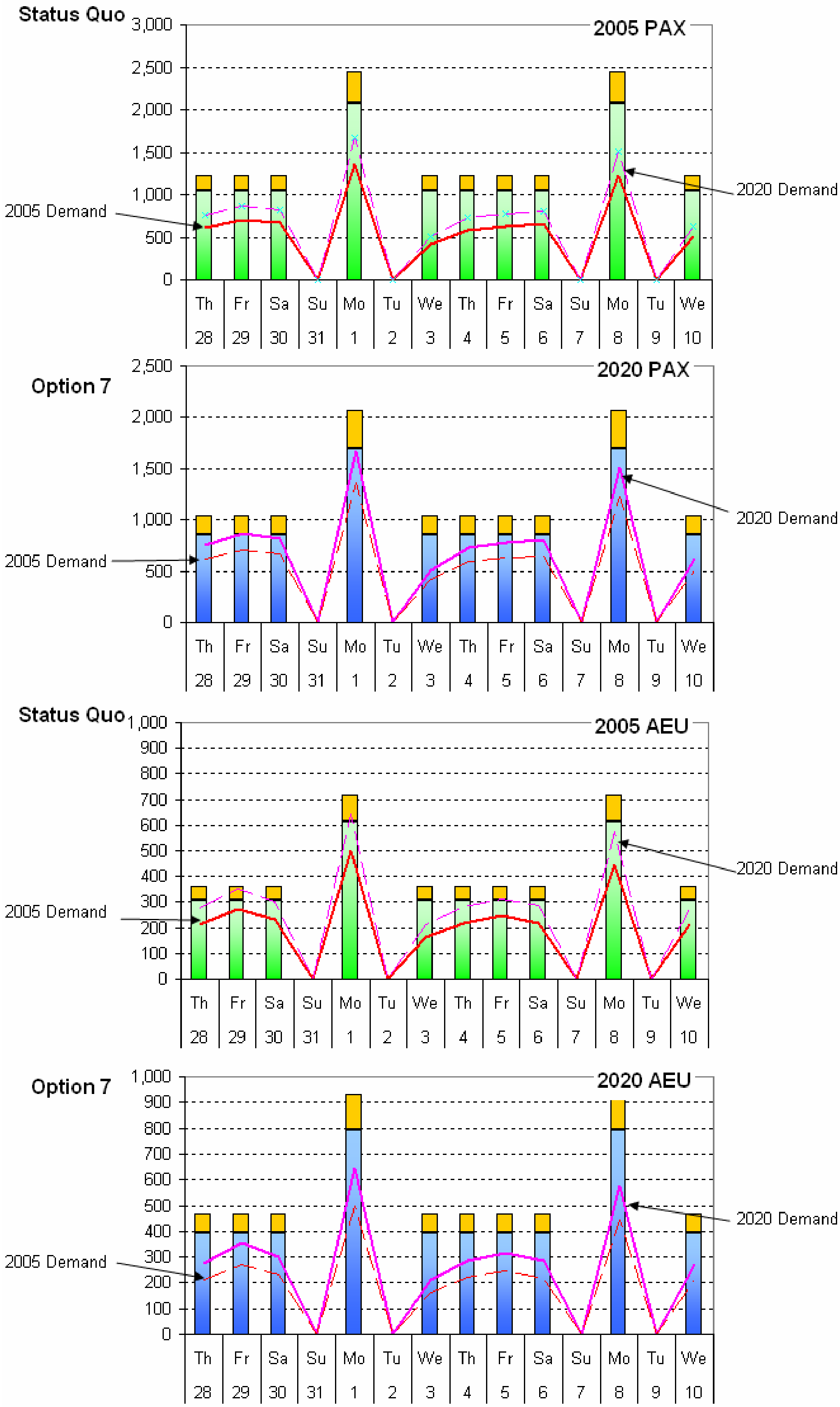








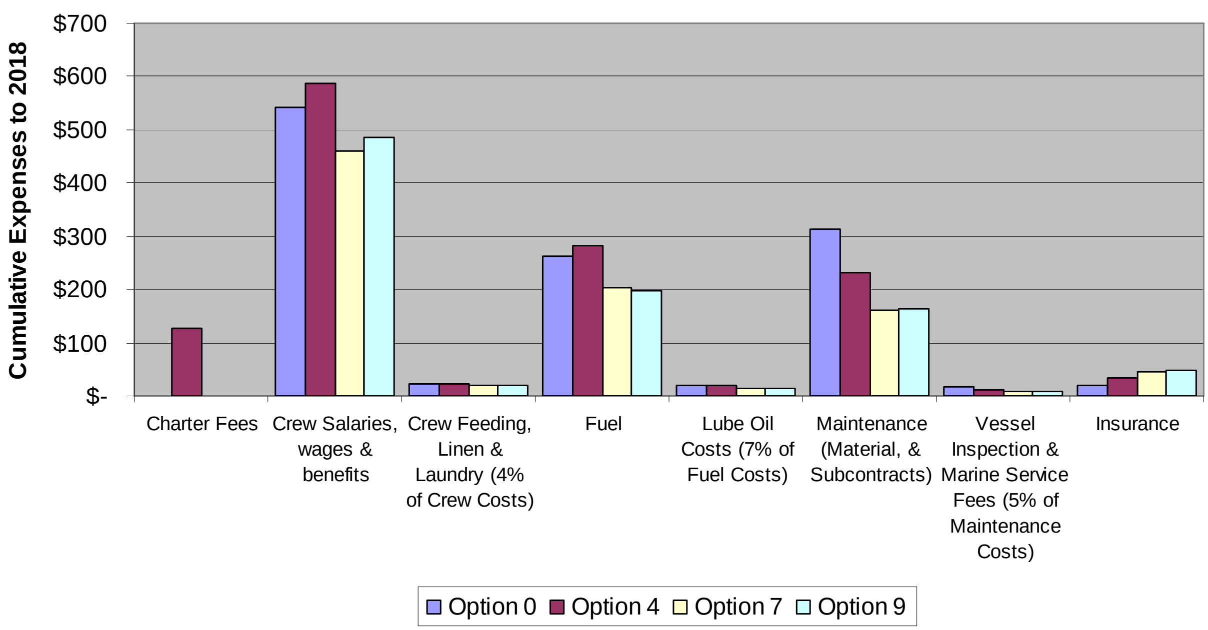
North Sydney
to
Argentia

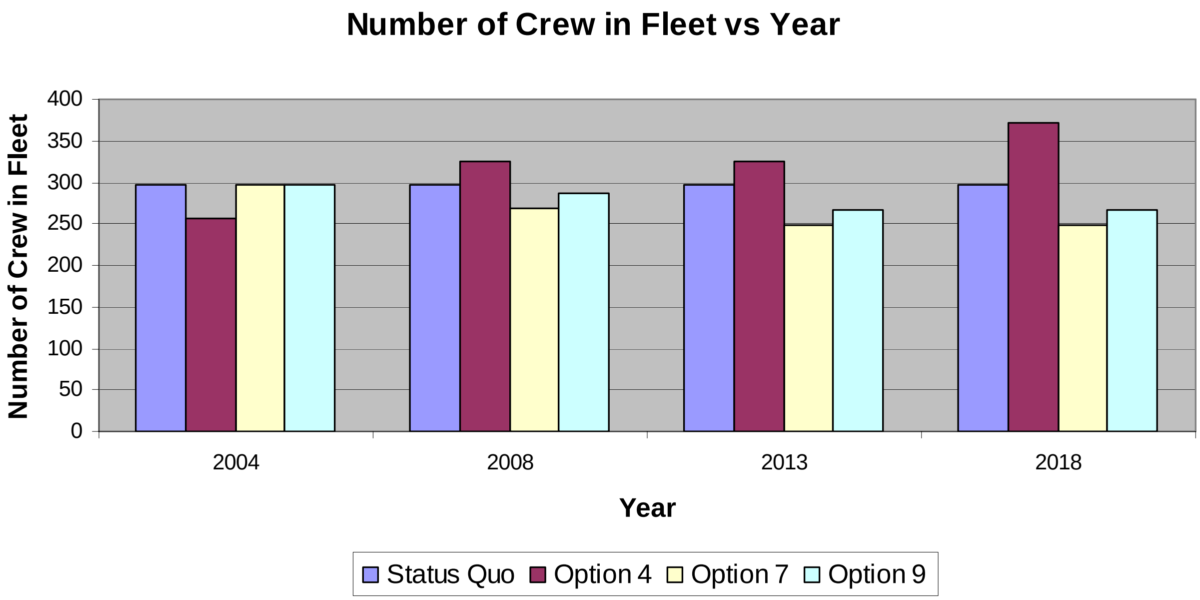


ANNEX E

Option ROM Check

Expenses by Option




Number of Crew in Fleet vs Year
Number of Crew in Fleet
400
350
300
250
200
150
100
50
0
2004
2008
2013
2018
Year
Status Quo
Option 4
Option 7
Option 9