

# Energy efficiency – No army marches on an empty stomach

By Michael Riese, Cold Logic

Figure 1

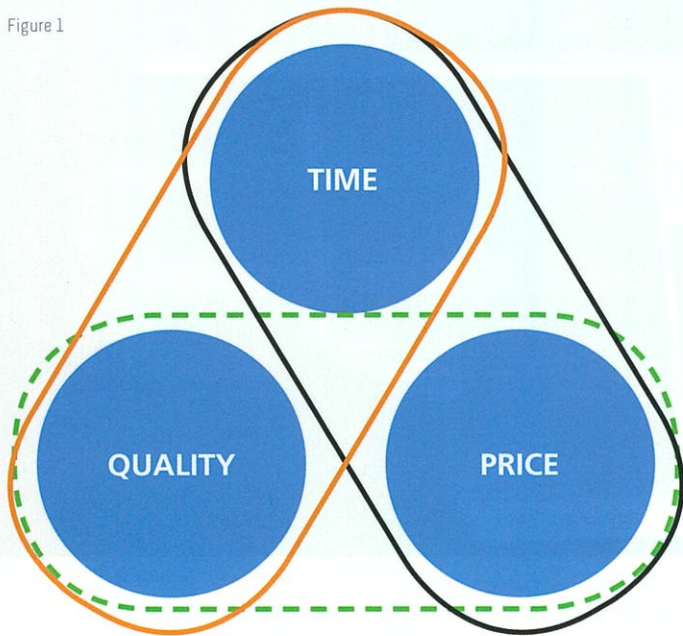
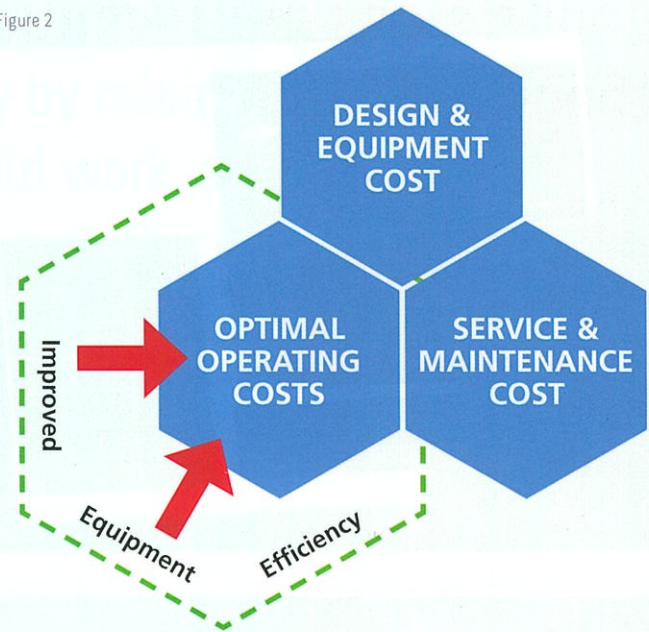


Figure 2



“Just between you and me, why should we care about energy efficiency of a fridge or freezer on a naval ship or a submarine?”

Well, why should we?

Generally, refrigeration and to a certain extent, even equipment cooling systems only form a minor part of a new military platform. If we consider comfort cooling, or commissary refrigeration, it could be argued that the equipment is not even considered critical to fulfilling the mission at hand.

But if they break down, this can turn into a serious headache for personnel on the ocean, repair crews and the logistics supply chain.

“No army marches on an empty stomach” said Frederick the Great and Napoleon Bonaparte. But the loss of provisions from a faulty freezer or the malfunctioning of the comfort cooling will not lead to prompt abandonment of the mission, like a combat system would.

So, how is this topic generally approached and addressed during the procurement and tendering phase?

There are requirements and guidelines for performance, space, power consumption, uptime, mean time between failures and system robustness to name a few. All of which influence the initial design and equipment costs and the through-life maintenance cost, which can far exceed the original costs.

But where is the link to the optimisation of the day-to-day operating costs?

Consider the triangle shown in figure 1. This is often used to explain the costs for the provision of professional services and it’s generally agreed on that you can only optimise for two items at the same time.

You can aim for short time frames and high quality, but the project cost will generally be very high. Or you can aim for minimum price and high quality, in which case projects tend to take a longer time.

However, returning to the task at hand of the procurement of a military platform, this approach is not suitable. Instead, the approach shown in figure 2 is more fitting as all three items have some impact on each other though they could theoretically be considered in complete isolation from each other. Figure 2 is only a theoretical outline and no emphasis has been made to quantify either part of the main groups, as they will change in percentage size of the overall costs from project to project.

This approach proposes that a less than optimal selection of equipment can have a significant impact on the overall ongoing costs.

Let’s relate this to an everyday example in Australia. If you were to go to a white goods retailer and wanted to buy a new fridge-freezer, there are many brands out there for you to choose from; all of which will have similar functions and features but vary in price, depending on the previously mentioned aspects.

However, each unit will also have an energy efficiency sticker glued to the front. And that will be one of the biggest differences to the ongoing operating costs. The energy efficiency will shape your power bill and make a difference to your hip pocket.

So how does this relate back to the original question of procurement and energy efficiency?

If we are considering Australia’s future submarines, everything will be predetermined early on; sizes, performance, available power reserve from the batteries and so forth.

It is possible to supply two near identical commissary refrigeration systems for the same price that will have significantly different outcomes in the total energy used to perform their duties. Furthermore, that difference will have a direct impact on the time it will take until the submarine has to resurface to recharge its batteries.

Having to resurface and recharge will have a direct effect on the operational range of Australia’s future frigates between refuelling. This then creates a challenge to supply chilled water for equipment cooling, comfort cooling for personnel and cooling of electronic equipment on future land systems as well as other items not even considered within this article.

Cooling and refrigeration equipment used by the Australian Defence Force is generally modified and assembled-to-order, commercial-of-the-shelf equipment (mCOTS) and that is here to stay.

In summary, the energy efficiency of mCOTS equipment can make a significant difference to the operating costs of a military platform. Australia’s procurement personnel do an outstanding job in selecting equipment that is fit-for-purpose and support our troops around the world. However, these people are not subject matter experts in chilled water systems, comfort cooling systems and refrigeration and many others, which form only a small secondary part of the overall platform. Nor are they expected to be.

Therefore, what we need is the right questions to be asked from the beginning of the procurement process and to use expert resources in Australia to make an informed decision and select the best value proposition.