

**The Delimara Power Station Extension Cost Benefit
Analysis (CBA) for the IPPC Permit**

Prepared by:

Dr. Edward Mallia

October 2011

INTRODUCTION

The declared aim of the Cost Benefit Analysis (CBA) (prepared by Cubed Consultants Ltd.) is to determine the best fuel to use from various aspects and under different so-called “scenarios”. The “scenario” technique is used in various disciplines where one needs to make future projections. The method involves making different sets of starting assumptions and following the evolution of the process of interest in time (the use of a particular fuel). In this case the choice of fuel has an external element of undefined properties influencing it: the inter-connector (IC) to the Sicilian grid.

There have been comments in the media at ministerial level that if Heavy Fuel Oil (HFO) is not used the people will have to suffer a hefty rise in electricity bills. The CBA seems designed to justify such statements in favour of the use of HFO, i.e. to try to buttress an already-taken decision.

This paper presents a critical analysis of the CBA with regards to assumptions made in arriving at the quoted values and the impact on the electricity tariffs by using the two types of fuel that can be used from the start in the Delimara Power Station Extension (DPSE), i.e. HFO and gasoil.

COMMENTS ON ASSUMPTIONS

The following comments concern the CBA directly.

1. The assumption of equal piston engine maintenance costs for HFO and gasoil use cannot be correct. HFO is not really suited to piston engines. In fact DPSE will need to be started and stopped while running on gasoil. It will also bleed steam from the (steam) turbine working off the piston engine exhaust to pre-heat the HFO, while still leaving some 3t/day of sludge requiring further treatment before final burning as fuel in the existing DPS boilers. These extra HFO maintenance costs were conceded in a letter sent to the Sunday 2nd October issue of Maltatoday

by the Communications Coordinator of Enemalta: “Although it is true that the cost of maintenance of the new plant operating on gasoil is expected to be less than that of the selected fuel, which is expected to be approximately €50 million, this would be less than 10% of the fuel cost when using low sulphur fueloil to power the new extension.” Now this concession not only breaks an important tenet of the CBA, i.e. that is that the maintenance contract already entered into by Enemalta is ‘fuel-independent’, but the cost given (€50 million) is too low. The contract has two elements: a fixed one which “involves an expenditure of almost €1.6 million per annum” and a “variable element [which] involves an expenditure of almost €3 per MWh produced.” Over 20 years, the fixed element amounts to €32million. Under the preferred generation plan, the variable element will reach €36 million for a total of €68 million rather than €50 million. And in another scenario which increases the contribution of DPSE, maintenance costs would come to over €104 million. Only in the case of almost total reliance on the IC after 2020 would the maintenance bill come down below €50 million, to €46 million in fact.

2. Enemalta has come up with the idea that the residual HFO sludge (3t/day will be produced) which cannot be burnt in the piston engines will now be burnt as fuel in the old Delimara boilers. No mention of the undoubted increase in treatment and boiler maintenance costs is made.
3. Assumption of present Delimara lasting till 2031 is not tenable. This is another scenario feature which is impossible to realise in practice, unless the machinery is practically mothballed for long periods.
4. The necessity to have a desulphuriser even if gasoil is used is not correct. This “necessity” is only designed to cover up the lie that the IPPC permit was going to decide on the chimney height and the fuel for DPSE. These had been decided beforehand; so much so that both chimneys and desulphuriser are already in place. When asked in a consultation meeting, Ing. Albert Farrugia (on behalf of Enemalta) insisted that a desulphuriser is necessary to provide a layer of sulphate on the bag filters which would not otherwise function very well. This cannot be

correct as bag filters are widely used where there is no, or a different form of desulphurisation.

5. The statement that all fuels considered –HFO, gasoil and natural gas – carry equal risks in use cannot be correct. HFO producing 31t of hazardous waste per day, requiring collecting, storing and eventual round-about land transport to the Freeport must carry greater risks than gasoil with no such waste. Handling, treating and burning the HFO sludge will also increase risk both to humans and to boilers. And use of HFO will also require a large gasoil reserve in case of breakdown in the waste disposal chain stopping the use of HFO.
6. The CBA has a section dealing with emissions, where the so-called Shadow Prices of emissions are discussed. Among the emissions listed are Arsenic and Cadmium, which must be present in HFO. But the prevalent metals in HFO are Nickle (Ni), Vanadium (V) and Lead (Pb) in that order (abundance about 1:0.5:0.1). Why are these not listed in the ‘shadow’ price list? A more restricted version of the ‘same’ problem exists in the air dispersion study, where Ni and Pb are included but V is not. As the source for these metals is HFO and not gasoil, these omissions clearly “improve” the case for use of HFO.
7. Some remarks about the Sicily IC: against general international practise Enemalta decided on an alternating current (AC) and not on a Direct Current (DC) link to Sicily. When asked for reasons behind that decision, Ing. Albert Farrugia (on behalf of Enemalta) said he did not know of any as that decision was outside his remit at Enemalta. That does not excuse Enemalta from giving answers to such questions, as that decision influences both capital and running costs of the IC. Nor was any information provided for the assumptions that the IC “will (please note the use of “will” not “may”) optimise costs from the financial and emissions perspectives”. Both of these “perspectives” will depend on the power source or sources to which the IC is connected. As yet Enemalta has no information either on these points or on the claimed “flexibility” of output of the IC, which again depends on the source or sources to which it is connected.
8. There are other points touching on the role of the IC in the CBA. It is the intention of Enemalta to give it pride of place in the post-2014 generation plan. By that

- year, or possibly by 2015, the IC is expected to provide 76% of demand and DPSE 24%, with present DPS the remaining very small amounts. What that implies in practice is that DPS (old and new) is expected to generate 500GWh in 2014 and 676GWh in 2031; while the same figures for the IC are 1676GWh for both years. Question: Will 700GWh justify the heavy investment a gas pipeline requires? Neither the writer of the CBA nor Enemalta could answer that question..
9. But there is another generation scenario: beyond 2014 this has DPSE providing slightly more than half the demand (1250GWh) and the IC the rest. Now for a 145MW installation (DPSE) to provide 1250GWh in a year it must operate at full output for 8600 hours in a year, i.e. 98% of the time. No engineer will regard that as feasible, because of inevitable downtime needed for maintenance. (NB. Neither one of the apparent conundrums in 8. and 9.is insoluble. But they do illustrate an element of superficiality in the scenario building.)

IMPACT ON ELECTRICITY TARIFFS

The immediate impact of starting the Delimara Power Station Extension (DPSE) on gasoil rather than HFO

The crucial figures, obtained from the CBA, are the following:

1. The cost per MWh from DPSE (fuel cost).

HFO	€87
Gasoil	€131

2. The average efficiency (23%) of present Marsa Power Station versus future DPSE (46%).

3. The preferred generation plan

	2012	2013	2014
MPS	35%	11%	0%
DPS(existing)	35%	24%	0.78%
DPSE	30%	46%	24%
IC	0 %	20%	76%

4. The average cost of electricity for 2012.

For 2012 DPSE will take over 1/3 of total generation, which formerly came from Marsa. If DPSE used gasoil instead of the HFO used at Marsa **at the same efficiency as Marsa** , the unit cost would be $131/87 = 1.5$ i.e. 50% higher. But DPSE has **twice the efficiency** of Marsa so that it will use half the fuel that Marsa would use. So the average cost of DPSE gasoil units is $1.5/2 = 0.75$ or three quarters of the old Marsa units. **The overall cost of electricity in 2012 should in fact go down through use of gasoil in DPSE.**

For 2013 there is a further shift of generation from inefficient Marsa and even the somewhat more efficient (32%) old Delimara to the efficient DPSE and to the Sicily interconnector (IC), loosely described as “expected to optimise costs from both the financial and emissions perspective” -- unfortunately no one says by how much, probably because no one knows. The “cheap” IC and the efficient DPSE are expected to provide 66% of generation, with old Marsa (11%) and old Delimara (24%) helping out. Without firm figures for the IC unit cost nothing precise can be said about average cost of units

compared to the present, but no significant increase from present seems likely provided there is no hefty increase in oil price. It is pertinent to point out at this stage that the actual value for the average efficiency of existing Delimara depends critically on the intensity of use of the 110MW combined cycle 'gas' turbine, with an operational efficiency of 38% but capable of using only 'expensive' gasoil (or non-existent natural gas) as fuel.

Much the same situation can hold for 2014, where Marsa has stopped altogether, old Delimara provides less than 1%, DPSE 24% and the "optimised" CI 76%. Beyond that, it is impossible to make a comparison with present costs. For the DPSE one could use the projected increase in HFO and gasoil prices but that still leaves the large contribution from the IC unaccounted for, as nothing is known of initial unit cost at present and still less of its subsequent evolution.

CONCLUSION

Some of the assumptions presented in the CBA are either weighted to justify the use of HFO or lack those elements that would in reality present an advantage to the use of gasoil. Despite this, using the same values provided as costs for electricity generation, due to the difference in efficiencies of the existing Marsa Power Station and the DPSE, the overall cost of electricity generation should still go down through the use of gasoil in the DPSE, in the initial years of operation. But even taking the CBA conclusions for the long term as gospel, the difference between HFO and gasoil costs is said to amount to just 0.3% of GDP accumulated to 2031. Surely it is worth spending that sum to avoid the risks involved in massive use of HFO.