



Delimara Gas and Power

Combined Cycle Gas Turbine

and

Liquefied Natural Gas

receiving, storage, and re-gasification facilities

Delimara Power Station

Triq il-Power Station – Marsaxlokk

ENVIRONMENTAL IMPACT STATEMENT

Coordinated Assessment Report

Volume Seven

Public Hearing

Comments and Responses

Environmental Impact Statement

Delimara Gas and Power
Combined Cycle Gas Turbine
and
Liquefied Natural Gas
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Comments of the public regarding the 3rd draft of the EIS concerning the proposed CCGT Plant and LNG Facilities at the Delimara Power Station

No	Comment submitted by	Comments	Responses of EIS Coordinator
1	Din I-Art Helwa	<p>The Coordinated Assessment of the EIS (p.54) states that, 1.1.1.23 ... the SEA states that the Government was to make a decision regarding the preferred infrastructural system [and therefore technology] for gas, which decision would then be evaluated through an EIA, risk assessment and so on:</p> <p>At Government level, the type of infrastructure has not yet been identified. Once a decision is taken, detailed assessments including EIA, risk assessment etc would have to be carried out to identify and address any site specific issues. (ADI, 2012, p. 137) The complete quote from the SEA is actually as follows:</p> <p>“7.121. The use of natural gas for the generation of electricity will result in a reduction in the emissions because this fuel has lower emission factors than the fuels currently used for electricity generation. All types of technologies considered require either the building of infrastructure or some sort of intervention. The LNG Terminal has the largest land based requirements whereas impacts from the floating terminal and the pipeline are mainly marine based. The information available at this stage is not sufficient to point to a preferred option, even from an environmental point of view. More detailed studies are required. At Government level, the type of infrastructure has not yet been identified. Once a decision is taken, detailed assessments including EIA, risk assessment etc would have to be carried out to identify and address any site specific issues” (p. 137)</p> <p>It is clear in the full quote that the SEA first calls for detailed studies to decide on a preferred option, including from an environmental point of view. It is only once these studies have been finalised and a decision is taken, that “detailed assessments including an EIA, risk assessment etc would have to be carried out to identify and address any site-specific issues.”</p> <p>Yet the required studies and environmental assessment identifying the preferred choice between an LNG terminal and an LNG gas pipeline have not been presented to the public and do not appear to have been carried out at all.</p> <p>As the EIS quotes paragraph 7.121 from the SEA, Din I-Art Helwa requests that EIS should address the points raised in paragraph 7.121 comprehensively and provide an explanation on why the required detailed studies have not been carried out.</p> <p>Din I-Art Helwa maintains that these studies should have been carried out as part of an update to the National Energy Policy, which would also have ensured that structured and objective public consultation takes place on all options for gas infrastructure.”</p>	<p>The excerpt from the SEA quoted by DLH states:</p> <p>More detailed studies are required. At Government level, the type of infrastructure has not yet been identified. Once a decision is taken, detailed assessments including EIA, risk assessment etc would have to be carried out to identify and address any site specific issues</p> <p>In other words, DLH do not interpret the SEA correctly. The preparatory work leading to the issue of the third draft of the EIS (which was discussed during the Public Hearing) reviewed the options studied in the first draft and subsequently the proposal submitted by the ElectroGas Malta Consortium.as indicated in the SEA, a decision was made with respect to the natural-gas infrastructure and then the preferred infrastructure system was evaluated through an EIA which includes a Risk Assessment.</p> <p>In the Coordinated Assessment Report (specifically on page 86) there is an explanation, which was provided to the EIA Coordinator by Enemalta, which explained why the 'out-of-M'Xlokk Harbour' option mentioned in the SEA could not be considered in the EIS. This explanation refers to the following issues:</p> <ul style="list-style-type: none"> - There is very little sea-room available for a shallow water platform which is fixed to the sea bed. - There has been no experience of installing a FSRU at a floating connection point to supply gas continuously to a single point. - Any FSRU moored outside Marsaxlokk Bay, including its attendant pipeline is likely to represent an obstacle to shipping. - The severe sea states outside Marsaxlokk Bay would reduce the ability of the FSRU to receive fuel from supply carriers. <p>Such conditions were considered too risky with respect to security of supply. The off-shore option was not however completely set aside, given that in the future, technological developments are bound to render the off-shore option a viable solution.</p> <p>Evidently DLH have every right to disagree with the arguments stated in the EIS, but they cannot argue that the public has not been informed through the EIS of the options mentioned in the SEA.</p> <p>One should also keep in mind that in the final analysis the outcome of an EIA is not just the EIS produced by the EIA Coordinator and his team, it also consists of information submitted during the Review and Public Consultation stages of the process by consultees (such as DLH) and the public.</p>
2	Din I-Art Helwa	<p>The comments on the QRA attached to this document in Appendix One, call for caution in choosing the final option, and requests that all marine-based options should be assessed further. Other comments received by Din I-Art Helwa include a gas pipeline, and a proposal to base the gas storage in an area at Hal Far. Have these options been studied and compared in adequate detail? If so, why have the studies not been made public?</p>	<p>Yes.</p> <p>Chapter 2 of the Coordinated Assessment report (of the third draft of the EIS) also refers, on page 104, to a letter from the Chief Officer of the Ports and Yachting Directorate Transport Malta, which states that the simulation studies carried out by his Directorate with respect to the location of the FSU in Marsaxlokk Harbour indicated that there is sufficient room for manoeuvre in the said harbour for both the LNG carrier (8 to 12 calls per annum) and for vessels attracted by other activities located in the harbour (2,700 in 2012). The Chief Officer also indicated that it would be essential for him to be provided with a full nautical risk assessment which would enable him to draw up the necessary harbour management plans and emergency procedures.</p>

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3	Din I-Art Helwa	<p>"The EIS has not provided an adequate answer to the following query made by Din I-Art Helwa in relation to the draft EIS:</p> <p>" 5. The Project Description Statement states that the Delimara 3 extension (when converted to gas) is only expected to have a utilisation rate of 50% once the proposed CCGT plant is operational. What are the expected utilisation rates of the proposed CCGT plant, the Interconnector, and the rest of the Delimara plants, from 2015 to 2020? What will be the "default pecking order" of the various power plants and the Interconnector? This analysis must be included in the EIS."</p> <p>The EIS coordinator response is as follows: "The EIS covers an application for a new CCGT and assumes that such CCGT will be utilised to satisfy base load requirements. Other considerations such as making more use of the interconnector and reducing the use of the proposed CCGT may result in less environmental impact, but such a decision is not only taken on the environmental impact but on a range of other considerations including but not limited to economic issues. Such considerations are being dealt with in the CBA which will form part of the IPPC permit as requested by MEPA."</p> <p>The EIS coordinator notes that "making more use of the interconnector and reducing the use of the proposed CCGT may result in less environmental impact". Din I-Art Helwa's earlier question, submitted in relation to the draft EIS, to outline the utilisation rates of the proposed CCGT plant, the interconnector and the rest of the Delimara plants, is clearly relevant and should be answered in the EIS which should address all environmental considerations and scenarios. No satisfactory answer has yet been provided to this question, which has environmental implications.</p> <p>The response also notes that the Cost Benefit Analysis is being undertaken as part of the IPPC permit. Once the IPPC permit application is already underway, this information should be brought to the MEPA Board for consideration at the same time as the planning application and related EIS. The development planning permit and the environmental permit of this project of national importance should ideally be considered together by the Board."</p>	<p>Rather than only studying a theoretical single scenario the purpose of the EIS was to identify and assess the impacts the proposed development would have on the environment, based on a number of scenarios, each representing a worst-case with respect to specific factors.</p> <p>The scenarios presented in the air dispersion sections of the Coordinated Assessment Report of the third draft of the EIS (in chapters 3 and 4) were agreed with the MEPA and were meant to ensure that the worst-cases would result in emissions acceptable under EU directives.</p> <p>Following 2015, Enemalta will be in a position to generate conventional energy through the use of fuels from a diversity of sources. As long as the thresholds and objectives established by EU directives are respected, Enemalta should keep its options open with respect energy mix.</p>
4	Din I-Art Helwa	<p>"Din I-Art Helwa had specifically requested in the previous round of consultation that stakeholders in the area would be shown photomontages of the project during the Social Impact Assessment. Yet the Social Impact Assessment for this EIS was carried out in July 2013, well before the photomontages of the final option were available, so stakeholders have not had the opportunity to view any images of the proposed layout and visual impact. Why have stakeholders not been shown up-to-date photomontages of the project, when it is clear that visual impact is a major concern? Why was the Social Impact Assessment not updated?"</p>	<p>As stated during the Public Hearing, the SIA was not a requirement in the Terms of Reference. It was used by the EIA Coordinator as the first phase of what was to be an on-going public consultation process (of which the Public Hearing also formed part).</p> <p>Under the EIA Regulations, the EIA Coordinator was/is only obliged to inform the public of the contents of the EIS between 03 January 2014 and 03 February 2014. Instead he chose to start informing the public in June 2013. By September 2013, the public was made aware of the visual impacts of the proposed FSU/FSRU when the montages submitted in the first draft of the EIS were made available to the Local Councils of the area and published in the media.</p> <p>It is a well-established reality that during the Review and Public Consultation periods of the EIA process, the media made sure that as many people as possible were made aware of the potential impacts of the proposed development.</p> <p>The response of the public during the 5-week long Public Consultation period (03 January 2014 and 03 February 2014) would constitute a de facto update of the SIA</p>
5	Din I-Art Helwa	<p>The Noise Impact Assessment recommends that development in certain areas of Marsaxlokk should be restricted, especially building heights, due to possible noise impacts. This is in line with the mitigation measures proposed in the national Noise Action Plan. Yet this recommendation does not appear to be included in the Coordinated Assessment of the EIS – why has it been left out? How will this issue be addressed and what detailed mitigation measures are being opposed?</p>	<p>All the reports submitted in Appendix Two of the EIS (including the noise assessment report and addendum) form an integral part of the EIS.</p> <p>One should also be informed that the Calleja recommendations were not meant to mitigate the impact of the proposed development per se. The noise assessment report also indicates in the detailed 'noise difference map' presented in the report but not in the Coordinated Assessment Report, that an overall improvement in noise impacts resulting from the proposed changes at the DPS (as explained in Chapter 1 of the Coordinated Assessment of the third draft of the EIS) is to be expected. It is unfortunate that some readers of the noise assessment reports seem to have missed this map.</p>

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6	Marsaxlokk and Birebbuga Local Councils	<p>"The result of the Social Impact Assessment carried out last year in the preliminary phase of this project (Annex II) shows very clearly that 91 percent of the population of Marsaxlokk want the LPG Tanker to be located outside the Port of Marsaxlokk.</p> <p>The residents are particularly concerned about the effects an accident will have both on their lives and property. Although there is acceptance that the plant operating on LP Gas will be cleaner, practically the whole population of Marsaxlokk wants to eliminate any risks of death or destruction by locating the LPG Tanker at a safe distance outside the Port of Marsaxlokk.</p> <p>In previous consultations, the Marsaxlokk Local Council had suggested that the location of the LPG Tanker within the port should only be a temporary measure, and that all preparations should be made to relocate the Storage Vessel outside the harbour, thereby eliminating all risks both to the Delimara Power Station and more importantly to the populations of both localities.</p> <p>The mooring of the LP Storage Vessel as detailed in the proposal by Electrogas Malta will also have a negative visual impact on Marsaxlokk and Birzebbugia which is already affected by the existing power station.</p> <p>The relocation of the Storage Vessel Outside Marsaxlokk Port will also minimise the negative visual impact of the development on both localities Furthermore the present plans should include for that connection of future gas pipelines. This would enable the connection of gas supplies from other sources, without disrupting operation of the plant.</p> <p>Should this comes to fruition, then the Storage Vessel will no longer be required resulting in an optimal solution eliminating both accident risks and the negative visual impact on both localities."</p>	<p>It should be noted that the use of the abbreviation LPG is incorrect. The proposed FSU would be storing LNG. The properties of the two fuels are very different.</p> <p>LPG is mainly made up of the heavier-than-air propane and butane and it is mostly used for commercial and domestic applications. It is stored in liquid form under high pressure.</p> <p>LNG differs from LPG due to its properties: natural gas is substantially lighter than air. While LPG is stored under pressure, LNG is stored at a very low temperature, which requires the use of different materials and standards.</p> <p>Currently, LPG is stored in Bengħisa in a facility (approved in 2010) which is situated adjacent to (i) Fort Bengħajsa (to the south-west) and (ii) [to the east] by the oil storage terminal that is located by the Freeport. LPG carriers make use of the berthing facilities which form part of the said oil terminal, in order to supply the LPG facility.</p> <p>The points made by the Councils are taken, and as stated above, these comments (like all comments made regarding the EIS) will form an integral part of the documentation produced during this EIA process.</p> <p>This EIA Coordinator is sure that the media coverage of the SIA has already made the decision maker (i.e. the Board of the MEPA) aware of the contents of the SIA regarding this matter.</p>
7	Marsaxlokk and Birebbuga Local Councils	<p>"MEPA has to be satisfied that other options in which the LNG tanker is located outside the Port of Marsaxlokk have been considered. Up to this point in time no option covering the location of the LNG tanker outside the Port has been presented by the applicant. MEPA should ask for and consider this option, and the ErA should compare it with the other option submitted.</p> <p>Ignoring this would mean having ignored completely the will of the impacted communities as protected by the Seveso III directive."</p>	<p>The two drafts of the QRA presented in the EIS package were submitted to the OHSA (the lead member of the Maltese competent authority under the Seveso Directive) soon after they were received.</p>
8	Marsaxlokk and Birebbuga Local Councils	<p>"The stated dimensions of the Floating Gas Storage Unit of about 285m in length, a beam of 43.5m and approximately a height of 45m makes this a very large vessel in Port.</p> <p>As the vessel will be berthed permanently along a jetty that is yet to be constructed, it will be a sight that will have a strong and negative visual impact, as is also emphasized in the EIA. The construction also includes the proposed pipeline between the FSU and the regassification unit which as proposed (above sea level) increases the negative impact on the development. The storage and fuel delivery installation as proposed would constitute an eyesore of massive proportions, having a direct negative visual impact on Marsaxlokk and Birzebbugia.</p> <p>Individuals present at the meeting also expressed their concern that the presence of the LNG Tanker inport will also have a direct negative impact on property market in the two localities."</p>	<p>As is noted above, the FSU proposal has been studied by the Directorate of the Ports and Yachting Directorate of Transport Malta. Chapter 2 of the Coordinated Assessment report (of the third draft of the EIS) refers to a letter from the Chief Officer of the Directorate, which states that the simulation studies carried out [by his Directorate] with respect to the location of the FSU in Marsaxlokk Harbour indicated that there is sufficient room for manoeuvre in the said harbour for both the LNG carrier (8 to 12 calls per annum) and for vessels attracted by other activities located in the harbour (2,700 in 2012). The Chief Officer also indicated that it would be essential for him to be provided with a full nautical and harbour risk assessments. These assessments are being prepared.</p> <p>The points made by the Councils are taken, and as stated above, these comments (like all comments made with respect to the EIS) will form an integral part of the documentation produced during this EIA process.</p> <p>This EIA Coordinator is sure that the media coverage of the montages has already made the decision maker (i.e. the Board of the MEPA) aware of the issues concerning this matter.</p>

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9	Birzebbuġa Sailing Club	<p>"In the name of Birzebbuġa Sailing Club, I would like to voice our concerns on how the LNG Storage and Regasification Facilities for the newly proposed Gas powerplant development at Delimara will negatively impact our sailing activities in Marsaxlokk Bay.</p> <p>Along the years our sailing areas within Marsaxlokk Bay started to gradually decrease and slowly shift away from the seashore limits of Birzebbuġa, this was mainly attributed to the adverse impact of the Malta Freeport operations and aqua cultural activities inside the bay. Consequently the delineated area between Delimara Point and Fort San Lucian foreshores towards Marsaxlokk village is the only remaining part of Marsaxlokk bay where our sailing club members could enjoy clear and unobstructed sailing conditions. Furthermore, dinghy sailing regatta standards specify minimum race course areas to be setup during national sailing competitions and the only remaining location which could cater for such space is precisely the waters in front of Delimara power station. In order to use such spaces, apart race course area A, the club held quite challenging and difficult meetings with Transport Malta officials so that for definite and agreed time periods, we are given authorization to use race course areas D and E (kindly refer to the attached notice to mariners 8/2013) whereby both areas would also overlap the shipping fairway lanes inside the bay so that both could cater for the minimum required race course area specifications. Hence use of the additional course areas D and E are of crucial importance for our racing events in case of adverse weather conditions outside the bay.</p> <p>Due to the reasons listed above, we are really concerned about the proposed gas power plant development, in particular the proposed position of the mooring jetty, the sheer size of the FSU vessel and the safety buffer zone that will presumably be established will permanently limit our ability to host national sailing regattas inside the bay and also moderately hinder a safe passage through the waters leading to Marsaxlokk unless compensatory measures are taken to provide alternative solutions."</p>	<p>The points made by the Club are taken, and as stated above, these comments (like all comments made with respect to the EIS) will form an integral part of the documentation produced during this EIA process.</p>
10	BEAG	<p>App Vol 7 QRA 2.6 the Dolphin is omitted so is Has Saptan whereas before it was stated that the Dolphin will have to be reallocated. Now the Dolphin effects are not taken in consideration</p>	<p>As stated in different parts of the Coordinated Assessment Report, in this EIA it was assumed, for the purpose of this application, that the Has Saptan Dolphin will remain in place. ElectroGas have indicated that the presence of the dophin in its current location would not affect their operations.</p>
11	BEAG	<p>"Visual Impact:- Dr. Elizabeth Conrad reported that six view points were assessed, after consultation with MEPA. These view points were five at Marsaxlokk while only one view point from Birzebbuġa. We strongly believe that this maneuver was a concerted based effort to lessen the cumulative negative visual effects that the proposed development would have on Birzebbuġa population."</p>	<p>The ZVI map and the VP6 photomontage are more than sufficient indicators of the visual impact of the proposed development on Birzebbuġa receptors. More montages would simply have shown more of the same.</p>
12	BEAG	<p>"As may be confirmed from fig 3.3 location of view points, the proposed development including, amongst others the FSU, a new fixed land mark to the Birzebbuġa residents. Black ship montage indicated with high CUMULATIVE visual impact. This can be clearly visible from Birzebbuġa suburbs with high density population such as Qajjenza Housing Estate, St.Georges Bay area, Secret Heart Promenade and Pretty Bay Areas, Wied ilBuni and St. Patrick Promenade and finally Tal-Papa Housing Estate with high Topography. We regret to note that the cumulative negative visual impact on the residents of Birzebbuġa such as the Freeport - Delimara Power Station - the FSU (floating storage unit) - other fuel supply boats frequently visible."</p>	<p>The points made by BEAG are taken, and as stated above, these comments (like all comments made with respect to the EIS) will form an integral part of the documentation produced during this EIA process.</p>

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13	BEAG	Again in Chapter 5 of the report Recommendation and Conclusion refers to the rehabilitation and restoration of open spaces. We ask therefore what are the Recommendation and Conclusion on the residents of Birzebbuga. We could not find any reference.	The recommendations for compensation focused on the needs of the Marsaxlokk population. This does not mean that the Birzebbuga population should not ask for their share of compensatory measures.
14	BEAG	Reference is here being made to the EU Directive with regards to the cumulative visual impact. Adding to the already negative visual impact to the residents of Birzebbuga goes against such Directive.	There is no directive which regulates cumulative visual impact.
15	BEAG	Best place for the FSU is outside Marsaxlokk Bay as jointly agreed by the Birzebbuga and Marsaxlokk Local Council. Taking in consideration other negative effects.	The points made by BEAG are taken, and as stated above, these comments (like all comments made with respect to the EIS) will form an integral part of the documentation produced during this EIA process.
16	BEAG	In view of the information initially supplied by the successful bidder that the new plant is very likely to be noisy. The fact that instead of one, we are now going to have three gas turbines and one steam turbine, the noise level will be extremely high.	The noise maps in the Coordinated Assessment Report and in the noise assessment report in Appendix Two [of the EIS] indicate otherwise. One should keep in mind that the EIS is solely concerned with the effects from Delimara and the proposed development.
17	BEAG	3.3 indicates the health problems which may be caused by noise pollution. How can one say that the noise pollution will have a negligible increase and within EU health limits in 2015 scenario, when the onshore and offshore noise levels will be on the increase.	Refer to the response to the previous comment. The noise assessment report and addendum, and the noise maps, should be read in more depth.
18	BEAG	EU Directive 2002/49/EC . Exposure to more than 65dB(A) should be phased out and at no time should exceeded. Those exposed to levels of between 65- 55 dB(A) and those currently exposed to less than 55dB(A) should not suffer any increase.	Refer to the noise maps in the Coordinated Assessment Report and in the noise assessment report/addendum in Appendix Two of the EIS. Most of the noise levels contributed by the DPS are well below the levels mentioned in the comment. Furthermore, the area under consideration does not fall under this directive. For that to happen, all the fields from Marsaxlokk to Birzebbuga would have to be built in the next two years; an unlikely scenario at present
19	BEAG	WHO Night Noise Guidelines for Europe (2009) No further increase in the long term noise levels should be accepted to this industrial source only that is the levels under consideration solely from Delimara Power Stations boundary vis-a-vis Marsaxlokk and its environs.	Refer to the response to the previous comment. The noise assessment report and addendum, and the noise maps, should be read in more depth.
20	BEAG	It is being proposed that a monitoring program is established, pre and post installation. This is being advised to help deduct any particular changes especially to night time level in the area of Marsaxlokk. We insist that Birzebbuga should be included in all the monitoring stages, where possible at first floor level where the bed rooms are.	A monitoring programme is proposed in Chapter 5 of the Coordinated Assessment Report. The expected changes would not reach Birzebbuga.
21	BEAG	"The population of Marsaxlokk is 3277 as per last survey The population of Birzebbuga is 9977 as per last survey Population per Sq Kilometer. Marsaxlokk 690/Km2 Birzebbuga 1100/Km2 Area Marsaxlokk 4.7Km2 Birzebbuga 9.2Km2 The report has the following misleading defects: Population at Marsaxlokk see above quoted 3,000. Population at Birzebbuga see above quoted 8,800. Distance we are quoting is from FSU not DPS as a whole see above. Summer time day and night population considered two folds at Birzebbuga. Working population at Freeport may vary depending on the number of ships calling at FFT. Distance of stand by ships and ships entering the Marsaxlokk Bay were never considered."	The population data in the EIS is accurate as it is based on the most recent information available in NSO documents. It is clear from the maps in the QRA that Birzebbuga is out of range of the type of incidents that are examined in the same QRA.

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22	BEAG	<p>Social Impact identified the negative effects that may cause health hazards to residents close to the plant. The benefit is the population at large who can stand to gain socio economic improvements on the generation of Power.</p> <p>We ask to put a price on the negative issues related to the Marsaxlokk, Zejtun, Birzebbuga residents. World Bank guidelines addresses environment and HSH</p>	<p>The social impact assessment was not meant to discuss health issues. This was the function of the health impact assessment – which indicates that the shift to gas should have positive health impacts.</p> <p>The points made by BEAG are taken, and as stated above, these comments (like all comments made with respect to the EIS) will form an integral part of the documentation produced during this EIA process.</p>
23	BEAG	<p>Fig 3.1.1. Shows a scenario of major pollutants such as Marsa PS, Airport and Free Port Facilities. The DPS is not included in the scenario, WHY? Let's not forget that DPS2A will be Stand By and DPS2B is classed as reserve power generation, both not running on LNG. Frequency of use these can as is to day release toxic gases and PM2.S and PM10. Shut down of MPS and DPS will contribute to much clean air, a positive effect for a change.</p>	<p>The DPS was included in all the evaluated scenarios.</p>
24	BEAG	<p>3.4.1. Please correct number of Calls at DPS from six to twelve. Current presence of heavy metals in the bay has be detected with carcinogenic effects. Dredging the bay will cause these metals to re surface with huge consequences. Quickest solution is to declare the bay as no swim area. Cadmium, Chromium and Mercury are present in the bay to-day caused directly by DPS This has a value on social impact and MUST be calculated in remuneration. Please consider the last paragraph of 3.4.2 ASap.</p>	<p>The number of calls is expected to be between 8 and 12 per year depending on demand.</p> <p>No dredging will be needed for this project.</p> <p>The points made by BEAG are taken, and as stated above, these comments (like all comments made with respect to the EIS) will form an integral part of the documentation produced during this EIA process.</p>
25	BEAG	<p>3.4.5 Effluent release: are we to finish with freezing water release instead of + SO above sea temperature. One must consider the LNG is -1650. An increase of sulphuric acid and biocaf (please define biocaf) is in small amounts, yet it is recommended further investigation from a health perspective. Is there something which we are no conscious about, hidden or unknown.</p>	<p>Natural Gas operations do not release sulphur or sulphur compounds into the environment.</p> <p>All the environmental information discovered during the EIA process has been submitted in the EIS.</p> <p>The water temperature will not be reduced, as the amounts of sea-water utilised for the heating up of the LNG is minimal, would never in direct contact with the LNG due to the proposed closed loop system and the cooler water is utilised as cooling water for the CCGT plant to optimise efficiency.</p>
26	BEAG	<p>We do not agree that the sea water effluent used to cool machinery and treat gas temperature will be the same as to day, there must be an increase of effluents. Due to the vast volume of water release, treatment of effluent is impossible. Request investigation to study best remedial solution.</p>	<p>It should be stressed that the proposed CCGT will be replacing DPS 1 and that DPS 2A and 2B will not be used on a regular basis. The former has been earmarked for temporary use in cases of emergency and the latter as a backup (also temporarily).</p>
27	BEAG	<p>Consider abdicate planning gain in a form of percentage reduction in power bills.</p>	<p>This issue can only be addressed by the Government.</p>
28	Environmental Health Directorate	<p>"The EHD is still concerned about the health effects and amount of nuisance from passing heavy plant vehicles (cranes, trucks, and so on) to and from plant during construction expected to last 18 months. The terms of reference, para 1.2.4 "Access, transportation and related infrastructure required "A forecast of the type, quantity and size of vehicles (and/or vessels) envisaged during each phase and their respective frequency of use, as well as an identification of the routes that vehicles will use to/from and within the site. The required arrangements should also be compared with the relevant existing situation (in terms of structural considerations, stability and state of roads, road width and gradient, turning circles and junctions, type of surfacing, and other physical or environmental constraints, etc). Interventions that would need to be carried out to accommodate the required vehicles (e.g. new or altered access roads".</p> <p>EHD recommends that the TOR Para 1.2.4 (quoted above) be respected and for interventions/mitigation measures during the construction phase to be detailed and carried out during actual construction period with the aim of reducing effects from the increased heavy vehicle traffic on sensitive receptors namely residents along the route to be taken by construction vehicles during the construction period.</p>	<p>Chapter 5 of the Coordinated Assessment Report of the EIS includes a detailed framework for the preparation of a detailed CMP with a strong environmental management chapter. The issues referred to by the Directorate would be discussed in the CMP.</p> <p>It should also be noted that impacts during construction works are of a temporary nature and should be weighed against the long term benefits of the project.</p>

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29	Environmental Health Directorate	The EHD is also concerned about possible increase in emissions from maritime transport both during the construction and operational phase. EHD acknowledges that a significant amount of shipping is present in Marsaxlokk bay to service the Freeport and that LNG shipments to the site will be less frequent than present HFO shipments. However, the LNG re-supply tankers may however be considerably larger than the oil tankers which currently serve the site.	The impacts during construction works will be temporary, while one should keep in mind that the new LNG trips will replace the ones which currently transport HFO to the DPS
30	Environmental Health Directorate	"All mitigation measures to address any sources of air pollution, noise, odours, vibrations and deterioration of water quality especially in bathing areas should be enforced. Appropriate monitoring and complaints handling must be established."	The points made by EHD are taken, and as stated above, these comments (like all comments made with respect to the EIS) will form an integral part of the documentation produced during this EIA process.
31	Professor Pasman	<p>Accuracy of QRA studies</p> <p>SGS performed the EIS land use risk assessment applying established methods. QRA is the best way to investigate a safety situation. However, the results have little absolute value, only relative; that is, it is useful to compare options but not more (In Annex 1 the 2000 EU study ASSURANCE is briefly summarized). Failure rates can easily be off a factor of ten or hundred. It are probabilities which can only be validated if many of the same kind of components exist, fail in the same mode, effect of local conditions can be included and the data can be treated in a statistically sound way. For the components applied here it is not very likely that such a data base exists. And even then, if a frequency can be established as lying in a certain range with an average of once in 10,000 years it can still happen next week. If, the risk source is that close to various kinds of vulnerable receptors as is here the case safety distances are also of interest. Hence, consequence analysis as SGS has performed, provides insight in the distances hazardous effects can reach. The weakness there is that any experimental evidence with amounts as large as a tank content (35000 m³) does not exist (the largest spill in an experiment was not even 70 m³). The effects can be stronger or weaker than predicted. But for the time being we don't have any other information. However, to state that the maximum extension of a flashing cloud is 962 m (scenario 03.a in the revision 2 of December 2013, see also Drawing #13) is suggesting an accuracy that is not justified. Are you safe at 963 m? What is the opinion of SGS in this matter?</p>	Our conclusions are based on two different parts: risk contour and damage zones. Risk contour was used primarily for comparison between the three options, and involve failure frequencies. Regarding damage zone, they are not subjected to frequencies, thus they are saying what happens if it happens tomorrow.
32	Professor Pasman	<p>Possible scenario of damaging the CCGT installation</p> <p>QRAs are focused on calculating fatalities. A real large hazard in this case is however also the ingestion of leaked natural gas by the combustion devices of the power station. These become uncontrolled due to the fuel that appears all of a sudden in the air intake, even if the concentration in the air is below the explosion limit. This may lead to turbines getting out of control which may end in power failure and further escalation. If the concentration in the cloud is above the explosion limit, it may also cause strong ignition of the cloud. The mechanism of revving up a combustion engine has played a major role in several catastrophic accidents initiated by fuel leakages. SGS did only consider the hazard of a cloud being ignited at the site of the power station which would also cause heavy damage. How much margin is available in the present plan between edge of a possible cloud and air intakes (in view of drawing 13)? Has the topology of the hills surrounding the location been taken in account at a spill in case of a southern wind of low velocity?</p>	<p>It is important to state that with respect to the new CCGT, turbines from Siemens or GE are generally equipped with systems to protect against pollution of air intake ensuring that the turbine would automatically shut down if the presence of pollutants in the vicinity of the intakes is sensed (when the concentration of oxygen is lower and / or the combustion is not stoichiometric). However, the cited example is true and is catered for in any petrochemical complex, where this is the only possibility for an explosion, being all the other sources removed or protected. Notwithstanding this the report considered 100% ignition probability within the Enemalta Plant, attributed to the presence of electrical equipment, uncovered wires, etc</p> <p>Given that the size of the obstacles (i.e. the Delimara cliffs) to the extension of the gas cloud is less than 10% of the total length of the cloud topography could not be taken into account.</p>

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33	Professor Pasman	<p>Reliability and effectiveness of protective/mitigative measures</p> <p>The largest probability of a leak is the failure of the permanently functioning loading arm between FU and the regasification plant. What experience has been collected with the special safeguards (ERC Emergency Release Couplings) to protect against the failure of a loading hose as mentioned on page 65 of 88 about the ElectroGas proposal and in Annex C? Unreliability of a possibly sticking valve is not included. And what shall be the reliability and the effectiveness of a water curtain, more sophisticatedly called hydro-shield, in relation to scenario O3.a on page 65? Water curtains have been tested only on small scale LNG clouds and the effectiveness depends on many factors which can only be investigated by experiment. Does SGS have an answer?</p>	<p>In case of a stuck valve, there are redundant safe-guards. Water curtains have been engineered to optimize the dispersion of gas in case of incipient leakage, and a complete set of them over a high structure (i.e. the unloading arm) can develop a virtual wall of up to 50m x 20m = 1000 m². This protection is in place in any jetty and any LNG tanker, in order to cut off the affected area. Detailed studies such as Failure Tree Analysis (FTA), HAZOP or SIL allocation would guarantee viability of the system to be engineered and purchased. Also, these systems would be certified by third party, inspected before and after installation and tested once in place.</p>
34	Professor Pasman	<p>Cloud dispersion aspects</p> <p>Page 38 of 88: With respect to prediction of cloud dispersion with the topological conditions mentioned (30 m high hills in all directions except West), it would make sense to make separately cloud dispersion calculations with a validated CFD code, e.g., FLACS, because the cloud dispersion models in EFFECTS (or DNV's Phast) are integral models and are unreliable for close-in effects and interaction with obstacles and hills. Especially with heavy gas cloud and low wind this can be very important. Cloud dispersion is slowest during windless night condition and high stability, p. 36. The most favorable conditions for long stretching clouds are usually the presence of inversion layers. Please, comment.</p>	<p>Integral models are considered adequate for first approach calculation on the large distance when the size of the obstacles is lower than 10% of the total length of the cloud (hills are 30 m high while cloud can be 300- 600m long).</p> <p>The presence of inversion layers is an important issue in the dispersion of hot gases emitted from a stack at a relatively high altitude, comparable to the high of obstacles creating the inversion itself. Also the phenomena can have an important effect on the dispersion of toxic gases, when a very low concentration (few ppm) needs to be simulated (ammonia, chlorine, etc). The effect on the ground level, when simulating concentrations of flammable substances at low temperature, is minimal and can be neglected</p>
35	Professor Pasman	<p>Ship-to-ship collisions</p> <p>How will the incoming tanker manoeuvre? On page 67 of 88 SGS considers in a very rudimentary way the risks of ship-ship collisions in the relative narrow and busy waterways near Marsaxlokk; why not asking this to an institute experienced in investigating ship-ship collisions and grounding? Collisions can occur between the storage tanker (floating storage unit, FSU) or incoming tank ships and departing freighters and fishing vessels, passing ships etc. Outflow of LNG on water causes rapid spreading and violent boil-off. SGS did calculate in scenarios B01.a and .b the consequence of a tank of 35000 m³ emptying after having sustained a hole of 0.36 m² and reports a flash fire maximum distance of 129 and 133 m. Hightower et al. (Sandia report 2004-6258)¹, probably world's best experts on LNG risks, expect that even at very low speed and the most safe double walled tanker construction, a 90o collision will result in a tank being pierced. (Up to 4.5 knots the tank will not be penetrated, but at 6 knots collision speed the opening in the tank becomes already 5 m², although there is a chance that the two ships do not separate after the collision.) An opening of 1 m² will be sufficient to extend the distance to the lower explosion limit to 1.5 km in case the LNG does not ignite immediately! In Boston and Rotterdam harbors stringent precautions are taken to control traffic when a tank ship arrives, but there is no permanently present FSU moored which increases the probability considerably. For a new LNG terminal in Rotterdam harbor in 2008-9 extensive maritime port safety risk assessments have been performed by the Dutch MARIN institute with long-time experience in ship collision prediction resulting in a detailed admission policy. We appreciate SGS's conclusion with respect to maritime risk assessment but what will be its comments to ship-to-ship collision consequences?</p>	<p>Although impact from other vessels has been considered as a credible scenario, detailed ship to ship collision analysis is not the object of THIS study and a separate marine study has been requested. Contact with MARIN has been done.</p> <p>Passman says up 4.5 knots tank will not be penetrated. Typically speed in the area would be limited. 6 knots = 11 km/hour, is very high speed in general for the available manoeuvring circle. Cited case of Boston and Rotterdam is very important, together with Ferrol terminal, is one with the most difficult access through a channel and very close to inhabited areas.</p>

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36	Professor Pasman	<p>Possible flame acceleration generating blast</p> <p>It is mentioned on page 66 of 88 that as can be expected, a cloud drifting towards the regasification and further to the power station will find an ignition source. The report does not mention flame acceleration due to congestion, but that is the mechanism that makes clouds not only flashing but producing destructive blast. Pipework, fences, greenery, columns and smaller buildings provide congestion. Hence, we agree with the statement that ignition of a cloud drifted inside the plant area shall have to be prevented at all times. SGS suggested to increase the distance between the FSU and the plant. But how far is far enough? The consultant takes as the edge of the cloud the 5% lower explosion limit concentration. But pockets of gas can still be flammable below that average concentration and therefore one takes usually 60% of LEL. What is SGS' comment?</p>	<p>Blasts are included in the study. Probability is low according to natural gas behaviour. The only exception is that were the gas cloud touches the existing plant, which represent a 99% explosion probability and has been considered. With regards to safety distances the question is how far is far enough? It is important to note that the calculated case is the worst case in absence of any safeguards. Containment basins, together with hydrosields and foam and Emergency Shut Down (ESD) logic activated by gas detection would lead a leakage minimisation, pool minimization and evaporation rate minimization. Real accident with 100% emergency systems working will drastically reduce the length of cloud with respect to the calculated distance.</p>
37	Professor Pasman	<p>Event frequency increasing human factors</p> <p>The reports confine themselves to a generic land use planning safety aspect and do not consider the effects of operational safety. Organizational and human factors in operation and maintenance have a strong effect on the mentioned failure rates and event frequencies. The reports base themselves on Seveso II and the 2003 Amendment. These directives introduce, besides others, the safety management system and process safety performance indicator metrics. Implementing and maintaining this requires local process safety competence and in view of the complexity of the installation of relatively high expertise level. Meanwhile Seveso III is into force (2012/18/EU) emphasizing the requirement of drawing up internal Enemalta emergency plans and providing data for external community plans, while inspection/auditing requirements are further strengthened. Are there any preparations from the side of Enemalta for the safe operation of the installations, since it needs considerable time to establish this for a complex Seveso top-tier plant? Indeed, the present QRA study can only be considered as preliminary. SGS states at page 41 of 88 commenting on further hazard identification techniques as HazOp: " Experience teaches us that for highly automated and controlled processes, these techniques add no additional credible scenarios Too few details are available to make more refined analysis." Our comment is, it may not add new scenarios but it usually can increase significantly the expected frequency of existing scenarios. In case of large safety space this would not be a problem, but in view of the small distances to population, other ship traffic and industrial activities it is a problem, and a definite answer to the question is it safe enough can hardly be given. How do you comment?</p>	<p>HAZOP is extremely important and can give us details about the frequency of each scenario. But the approach of increasing the frequency in the study is not according to the ALARP criteria. What we have to do is to implement additional safeguards and safety instrumented system (SIS) strong enough and certified for each purpose, so that the frequency is controlled. This is done through the extension of HAZOP up to functional safety studies (standard IEC 61511, layer of protection analysis (LOPA), failure tree analysis (FTA), all them based on final design of the plant. It is important to note that in projects of this type it is not normal procedure to arrive at this level of detail prior to the development permit. Such a level of detail is determined prior to the operational permit (IPPC), particularly considering that details are provided by vendors of the different equipment.</p>
38	Professor Pasman	<p>Operation of resupplying the FSU and of feeding the regasification unit</p> <p>The arrival of fresh supply by LNG tanker and unloading operations are another risk source. In line with the previous point this is a rather frequent operation giving cause to leakages and spills. In itself these spills may not be large, but in case of ignition by lightning or static electricity the problem is possible escalation. The ship structures provide confinement/congestion to spilled gas. The scenarios pertain all to component failures. Why are errors in the human operations not considered? What overfilling precautions have been taken from resupply ship to FSU? How is the continuous LNG flow from FSU to regasification plant controlled? What about loss of power and emergency shutdown e.g., in case of fire? Are any fast acting valves foreseen in case of breaking loose of any of the unloading arms?</p>	<p>Lightning or static electricity is absolutely not expected in an LNG tanker. The same applies for a LNG terminal. Human error expected and corrected, all operations are double checked by the distributed control system. Percentage of manual operations executed by man is reduced and all of them are supervised. Control systems are redundant. Overfilling of LNG tanker is not considered credible with state-of-the-art technology. FTA can be done. Flow would be controlled with absolute precision throughout the whole regas operation. The operation is very carefully controlled to obtain a continuous and stable flow. Emergency shutdown is covered, all instruments are linked to double source and or uninterrupted power system (UPS) plus batteries. Instrumentation installed in LNG terminals is provided with self-checking system and go to safe position in case of disconnection of cable, no signal, fire, damage, etc. ERC is a fast acting valve itself.</p>

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39	Professor Pasman	<p>Threats to the FSU due to events elsewhere in the bay area Threats to the FSU due to events elsewhere are not considered. What about a hydrocarbon spill in the bay due to a collision between for example a gasoline tanker and another freight ship, causing the gasoline to ignite? What are the operations at the dolphin in the bay? The storage tanker is an easy target for malevolent action, since it is in the field of view from many land position directions. A hole in a tank of 5-7 m2 is not that difficult to obtain. Are any security measures considered? Why are domino effects by other Seveso installations in the area not considered?</p>	<p>Domino effects of the proposed LNG plant in the Delimara power station were considered. When considering the domino effect and impacts that multiple installations such as Freeport and Gasco might have it is my opinion, from looking at similar installations, that such a type of study is never promoted by a single consultant or a company, but by the port authority or the any other competent for Seveso Directive compliance. Traffic regulation can result from this and this is not the purpose of this report. If questions are raised focusing on the other installations within the port it could be useful to point out that the installation used in LNG is, for example, safer than that used for LPG. In our opinion, the most important domino effect (and higher risk contribution) is related to existing facilities and should be studied due to the presence of LPG and gasoline.</p>
40	Professor Pasman	<p>Construction of the FSU To what specification is the FSU built? Single or double walled? How are the tanks insulated? With what materials? (Some insulating materials lose their insulating properties in case of external fire and may even themselves be combustible). At what pressures are the pressure relief valves set? How frequently can roll-overs be expected? Where is in such case the escaping vapor being led to?</p>	<p>The FSU is built to IGC (International Gas Code), IMO, Classification and flag state requirements. The tanks are to be double walled and insulated using pre formed Polyurethane panels with foil barriers and N2 blanket. Insulation is rated for continuous cryogenic use. Pressure relief valves will be set to 50 - 70kpa. Rollovers are not anticipated since there is mitigation by internal transfer and monitoring of temperature gradients to identify potential stratification. In the unlikely event that vapour is released from tank relief valves this would be sent to the forward vent riser.</p>
41	Professor Pasman	<p>Stability of the FSU, its maintenance and its connection with the regasification unit How is the mooring stability assured? How are the motions of the FSU relative to the fixed wall position compensated? How flexible is the connection with the on land installation and how its endurance? How will the maintenance of the FSU be handled? Is there a reserve FSU available? As there is no buffer on land, there should be a continuous supply of gas to the turbines to guarantee power supply. How will the unloading arm, the feed pump etc. behave when permanently loaded? Has there been a reliability and availability study of these parts continuously in contact with the cryogenic?</p>	<p>Mooring stability is assured using good industry practice and simulations to prove robustness of the mooring arrangement. Motions of the FSU relative to the fixed wall position are compensated for through fendering and flexible hose offloading system. Hose data has been provided to OHSa consultants and included showing bend radius, construction methods and safety records. Detailed Periodic/preventative maintenance system is in place as per class and flag state requirements. No Reserve FSU is currently envisaged since FSU's are available in the market if an alternative vessel is needed. All systems are designed and rated for continuous use. A RAM study has not been completed but all parts of the system comply with relevant sections of EN1474 and classification rules.</p>
42	Professor Pasman	<p>Emergency planning A QRA and scenario analysis serve too for emergency planning. In fact, has there already a preliminary emergency plan drafted for the whole installation? Only small fires will be extinguishable. How will alarming and evacuation of workers and near-by population be organized? Emergency response will have also to come from the community, short response time is essential, how will the local councils cater for that?</p>	<p>The emergency plans have not been drawn up yet. Such plans will be drawn up as required under the Seveso directive using the same procedures that were recently used in another Seveso site located in the area (EIA Coordinator)</p>
43	Professor Pasman	<p>Need for technical details to appreciate the safety situation We understand that so far few technical details on the installation are provided. However the devil for safety is often in the detail. So, when can more information be expected?</p>	<p>Such details are normally made available to the public through the consultation process under the IPPC directive and currently the IED (EIA Coordinator) The scope of the preliminary QRA is to determine whether the FSU is compatible with the land use planning or not. As many other projects at this stage, calculation inputs have to be estimated and cannot be definite. For these reason, any permit issued within the IPPC/IED framework in the EU includes limits and restrictions which cannot be exceeded and needs to be corrected during the further phases of the project.</p>
44	Professor Pasman	<p>Some detail questions: Page 19 of 88: What purpose serves the propane system? P. 37: Releases on the jetty: 'pipeline from ship to storage tank'. What tank? There is no LNG tank on land, or is there?</p>	<p>The propane system is approximately 10 cubic meters total volume. Its purpose is for use as an intermediary heating system in regasification of LNG thereby preventing freezing of the heating medium. The use of propane increases reliability of the regasification process. There is no LNG tank on land for the storage of LNG.</p>
45	Professor Pasman	<p>There is an extensive Annex D on acceptance criteria, which can also trigger quite a few questions and comments, but I assume Malta does not have quantitative risk criteria cast in law and acceptance will be on adequacy of design, site positioning, lay-out and risk reducing measures taken including the ALARP (as low as reasonably practical). Hence, this annex may not be relevant at this time. SGS does mention in the annex US Department of Energy but not the US FERC acceptance regulation for LNG (exclusion zoning), which is on radiant heat threshold (5 kW/m2) and vapour concentration (50% LEL) limits.</p>	<p>Annex D is generic, not specific for LNG regulation, in fact EN 1473, is not mentioned.</p>

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46	Professor Pasman	The QRA as performed by SGS is not only preliminary in the sense that it lacks precise data on the construction and sub-systems of storage ship and regasification installation, but it is also seriously incomplete because it does not contain a risk consideration of ship-to-ship collisions and other maritime risks, while the pool formation on water from a leak in one of the 35,000 m3 tanks is treated very unsatisfactorily. Regrettably, the latter I became aware of after the public meeting, because these scenarios present consequences on the largest distances.	Ship to ship collision is treated including all cases in one scenario, the first one, considering the possibility of third ship collision with moored FSU or LNG tanker and introducing in the frequency the traffic of ships in the whole port. The size of the hole have been limited considering that is directly related to the size of the third ship and her speed and both are limited in the port due to nautical reasons. However, the Marine Risk Assessment would close any discussion establishing any required limitation in port traffic
47	Professor Pasman	In fact, the permanent presence of at maximum 130,000 m3 LNG in a floating storage unit and the temporary presence of a supply ship with the same amount form a threat to the power station, the container harbour, fishing ships, lives and health of people the vicinity. LNG stored in a water environment allowing unbounded pool formation is inherently much more unsafe than stored on land in a bunded park with double walled tanks.	LNG transportation has the safest record in the nautical industry, far away from transportation of any other dangerous goods.
48	Professor Pasman	In scenarios B01a and b of a tank wall penetration (gas tanker – release on water) Mr. Roberto Vaccari assumed a maximum pool spread area of 10,000 m2. This assumption was based on three Dutch references ([21], [22], [25]), all known to me. Apart from the fact that I couldn't find the 10,000 m2 in the reports, nor any statements where it could be derived from, but it may be implied somewhere, I don't believe it is a fixed value. The area is determined by the leak rate, the spreading rate and the evaporation rate, and in general it will be larger with a larger rate of outflow. Calculation is complex and difficult. Fay (MIT, US) and Webber (HSL, UK) present equations, but CFD would be better. Not all physical properties of LNG are well known. Validation is not well possible, while there are only results of a few, old, small amount tests available.	The size of a pool is based on the effect of any spillage on a plane surface: the liquid will extend as far as possible and reduce to minimum thickness. Obviously this concept is true on perfectly paved surfaces. It's also true for non-mixing liquids on water, such as oil. But it's not clear for liquid mixing with water or vaporizing gases. In fact the mixing effect and the phase transition effects are working against the enlargement of the extension of the pool and are adding more and more turbulence even to stable and quiet water. For this reason, and based on real accident, the extension is commonly limited.
49	Professor Pasman	A recent paper in Process Safety Progress (attached) by a renowned American specialist expert (Mike Hightower, at Sandia) in this particular LNG risk aspect (with huge computer power at his disposal and funding by the US Senate) mentions the following distances depending on whether the cloud is ignited and forms a burning pool, or whether all LNG evaporates and a cloud drifts away: 1 m2 hole, burning pool, Ø = 148 m, injury threshold population (5 kW/m2) = 554 m 2 209 m 784 m 5 405 m 1579 m 1 dispersion , 148 m, distance to explosion limit 1536 m 2 209 m, 1710 m 5 405 m, 2450 m.	In the last review of the same paper (2012), distances have been reduced and a 5m2 breach is estimated to produce a pool of Ø= 253-546 m and injury threshold population (5 kW/m2) = 922-1894 m, confirming that prediction of these distances are still very difficult, even with huge computer power. Our commitment is in all cases to remove any possibility for a huge breach, higher than 0,5 m, by reducing the impact energy or the third ship speed.
50	Professor Pasman	The larger the leak hole the shorter the spill time (40 minutes at 1 m2 to 8 minutes at 5 m2) The paper does not specify all weather conditions as these will have an effect, but it is clear that the distances in the SGS report of 129, 133 and 138 m of the B01 scenarios (page 65 of 88 in revision 2) are a severe underestimate. The probability of such a hole depends much on the conclusions of a maritime risk analysis.	Ship to ship collision is not object of the study and a separate marine study has been requested. It's clear that the larger the hole, the bigger the pool, the flammable cloud, etc. Our commitment is in all cases to remove any possibility for a huge breach, higher than 0,5 m, by reducing the impact energy or the third ship speed. Traffic regulation and minimization of the speed would be proposed by the marine study.

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51	Professor Pasman	About the dispersion model applied in the TNO Risk curves software can be mentioned that it is a so-called integral model (2nd generation) taking account of heavy gases such as chlorine. How it behaves with a gas as LNG that is initially heavy, slowly warms up and becomes lighter than air, I don't know. It is certainly not suited for hilly terrain, buildings and low wind speeds. The only type of models that can calculate this kind of situations is the 3rd generation Computational Fluid Dynamic (CFD) type. The only CFD model that is rather recently validated and approved by the US authorities, is the Norwegian one I already mentioned and is called FLACS. Attached is the 2010 paper. That the US FERC (Federal Energy Regulatory Commission) approved is important, because in the US the safe distance is dependent on the dispersion and dilution till half the lower explosion limit, which is 2.5%.	Integral models are considered adequate for first approach calculation on the large distance when the size of the obstacles is lower than 10% of the total length of the cloud (hills are 30 m high while cloud can be 300- 600 m long).
52	Professor Pasman	Low wind speeds, below 2 m/s, create the most hazardous conditions. Figure 4 shows e.g., test MS27 (Maplin Sands near Thames estuary UK in 1980) at 5.5 m/s wind speed a distance to till 2.5% LNG of about 350 m. The release rate was 23 kg/s. Mr. Vaccari mentions for scenario B01, 732 and 856 kg/s, which I think is not too high, only about 1 m3 per second!!	Passman is arguing that with our high release rate, we should suggest longer clouds. It's a comparison, and we take this into account.
53	Professor Pasman	Failure probabilities for the components such as hoses, loading arms, and others are guesses. One cannot rely on it. There is some data collected in the US I expect, but I still have to see a sound data base on LNG components. So, risk figures are rather uncertain.	Being theoretically true that frequencies can be of a factor of 10, it is also true that LNG equipment presents a higher rate of fiability (10 or 100 times more fiable than normal equipment), while we have used generic frequencies, thus we can conclude that any possible underestimation in the frequencies is balanced by the high fiability of equipment.
54	Professor Pasman	The used model and the risk criteria (individual risk and to a lesser extent societal risk) have to be considered in the Dutch context of Land Use Planning against the background of compromises government-industry. If people really get upset, as in a recent case of carbon dioxide sequestration pilot test at Barendrecht near Rotterdam, the government backed off, although the risk curves were much below criteria. Also there, many uncertainties played a role.	Point noted
55	Marsaxlokk and Birebbuga Local Councils	Asphyxiation and Dispersion. Natural Gas is odourless and colourless. Although the report claims it is not toxic nor carcinogenic it remains a simple asphyxiant gas (Annex 2). The report mentions that a relatively high concentration of the gas is required for asphyxiation, no mention is made of the concentration level that will lead to asphyxia is made. This is of particular importance when considering dispersion o(the gas in the environment.	Asphyxiation hazard is generally not considered as a hazard for the population. The high concentration requested for this hazard to turn up is generally present only within the fences of the plant or in the vicinity of the jetty, where the presence of the public would be restricted due to security reasons. Asphyxiation is not directly due to the natural gas, but to the lack of oxygen. Oxygen is normally al 20,8%, when below 16%, excessive breathing takes place and below 4-6% the body enters in coma state. To have the 16% of oxygen is required to have more than 20-25% of natural gas in the air.

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56	Marsaxlokk and Birebbuga Local Councils	<p>LNG vaporises rapidly when exposed to ambient heat sources such as water, producing circa 600 standard cubic meters of natural gas for each cubic meter of liquid. When spilled on the ground or water, LNG will initially produce a cold vapour that is denser than air and will stay close to the surface or ground. As this cloud mixes with air, it will warm up and disperse into the atmosphere. The downward distance that the flammable vapours might reach is a function of:</p> <ul style="list-style-type: none"> • LNG spill rate / volume. • Evaporation rate, and • Prevailing weather conditions. <p>4.3.4.11 continues that in order to disperse to significant downward distances a vapour cloud must avoid ignition.</p> <p>This essentially means that unless the gas cloud ignites than the possibility exists that a gas cloud could traverse significant downward distances surely reaching not only residences around the station but also Marsaxlokk and Birzebbugia. This does not exclude that both localities will not be affected in the event of a detonation and deflagration of a gas cloud of relative proportions. This will be dealt with in the sections that follow.</p>	We agree on " the possibility exists that a gas cloud could traverse significant downward distances " but the conclusion of our simulation is presenting a result compatible with the presence of residences in the area.
57	Marsaxlokk and Birebbuga Local Councils	<p>The evaluation of the risks that the new LPG plant will present is based on a software model. The report quotes the utilisation of a software package ie EFFECTS 8.1.8. (Annex 4)</p> <p>References for the EFFECTS software package, which the report claims is copyright of the Dutch research organisation TNO, could not be traced.</p>	<p>The query "TNO EFFECTS" on google or any other search engine can easily lead to the TNO web page where documentation is available and contact with TNO can be made.</p> <p>The reader is referred to https://www.tno.nl/content.cfm?context=thema&content=prop_case&laag1=896&laag2=915&laag3=106&item_id=1480&Taal=2.</p> <p>One can contact Victor van Swinderen, whose contact details are located in the same page.</p>
58	Marsaxlokk and Birebbuga Local Councils	<p>The Software Model used to analyse gas cloud dispersions is based on meteorological data of the Port of Cartagena in Spain which bears no geographical resemblance to the Port of Marsaxlokk at all, and is therefore invalid.</p>	<p>All data used to simulate gas dispersion and the maximum extension of damage zones are referred to Malta and have been provided by the official meteorological service. Data from Port of Cartagena in Spain has been introduced only as a reference in the calculation of risk contour.</p>
59	Marsaxlokk and Birebbuga Local Councils	<p>The invalidity of the software model automatically invalidates the results of the whole risk analysis.</p>	<p>The model has been validated and is accepted in all the European Union. Application and use of the model according to standards and guidelines.</p>
60	Marsaxlokk and Birebbuga Local Councils	<p>No worst case scenario analysis is presented.</p> <p>No specific indication of deaths and destruction to property in the event of a worst case accident are analysed or presented. This risk has to be established.</p>	<p>The report includes a list of 14 scenarios, each one being the worst credible scenario for the considered equipment, according to guidelines and standards accepted in the EU. Number of deaths presented in the Societal Risk Analysis.</p>
61	Marsaxlokk and Birebbuga Local Councils	<p>Point 4.3.10.2 reads (Annex 8)</p> <p>In the case of the DPS (Delimara Power Station) a potential domino effect can occur through a fire and explosion"</p> <p>Vaccari lists a number of mechanisms by which fire could spread, and goes further in Point 4.3.10.10 (Annex 9) regarding explosions by stating</p> <p>The pressure generated by the combustion wave will depend on how fast the flame propagates and how the pressure can expand away from the gas cloud (governed by confinement). The consequences of explosions range from no damage to total destruction. The pressure wave caused by a gas explosion can damage personnel (?) and material or it can lead to accidents such as fires"</p> <p>Considering that these statements are made in the context of DPS, an explosion and fire could result not only in the loss of life of the operators but also in the loss of Plant. The security of supply is therefore now also drawn into question.</p>	<p>The existing DPS and the energy dependence of Malta from the DPS supply, makes DPS relevant in the report. The conclusion aims to ensure in the layout that the FSU is located as far as possible from DPS, in order to avoid any possible domino effect between both installations.</p>
62	Alfred Falzon	<p>Which part of coastline from Power Station to light house will be out of bounds to stakeholders, i.e. fishermen, small craft and bathers?</p>	<p>This is for the MEPA to decide after the assessment by the OHS&A of the Risk Assessment reports.</p>

Comments of the public regarding the 3 rd draft of the EIS concerning the proposed CCGT Plant and LNG Facilities at the Delimara Power Station			
No	Comment submitted by	Comments	Responses of EIS Coordinator
63	John Pace	What provisions are to be made for the disposal of boil off gas when the regasification plant is shut down suddenly when delivering full output, or in the case of a planned outage?	When the regasification plant is shut down suddenly the boil off gas will be redirected to a non-visible combustion chamber (NVCC) located adjacent to the regasification facility. Planned outages are organised to ensure that gas flow is maintained thereby ensuring that power plant gas turbines can be supplied with boil off gas continuously. The regasification unit itself has been designed to ensure continuous operation and thus consumption of boil off gas even during its own maintenance.
64	John Pace	An estimate of the frequency and duration of emergencies resulting in flaring of excess natural gas. Such estimates should be based on experience of the existing CCGT plant and of the peculiar nature of a new gas fired plant.	There is no existing gas fired CCGT plant on the Delimara power plant site. The design of the facility for disposal of excess natural gas is the non-visible combustion chamber (NVCC). The only emergencies envisaged as being associated with the needs for disposal of excess natural gas are ones where the regasification plant or associated equipment becomes non-operational in which case the NVCC will be utilised. The ElectroGas Malta CCGT power plant configuration and design was selected on the basis of its record of high inherent reliability in more than 50 installations. It is expected that the CCGT will have reliability in excess of 99% per year throughout its life. Thus, it is anticipated that unplanned shut down of this plant will occur at a frequency of not more than three days per year. There is an envisaged high probability that during these periods the Enemalta gas fired power plant would be available for the consumption of boil off gas or the NVCC.
65	John Pace	The amount of gas flared at various scenarios, and the duration of the flaring.	There will be no gas flared under any scenario. The ElectroGas Malta response to the RfP was mindful of, and complied with, the requirement that there should be no gas flaring. This was recognised on the basis that the visual intrusion of a gas flare was deemed inappropriate in the locality of the Delimara Power Plant site.
66	John Pace	The amount of carbon monoxide and of particulate carbon produced by flaring as a daily maximum and as a yearly total.	There will be no significant carbon monoxide produced as a consequence of burning natural gas in any situation envisaged on a daily or annual basis. Where boil off gas or operational gas is combusted the product of combustion will be carbon dioxide. There will be no particulate carbon produced from the combustion of natural gas. Natural gas is a cleaner fuel than the liquid fuels currently used on the Delimara site.
67	John Pace	The effect of the CO and PM emissions on the National Emissions Ceiling and other obligations.	Flaring is expected to be minimal, and therefore its effects on National Emissions Ceilings is also minimal.
68	BEAG	The use of 3 loading arms may be a better solution than the cheap 5 flexible hoses. Besides flexible hoses are liable to break because of extreme temperature causing leaks	QRA Report includes an Annex with a comparison between arms and hoses, and the conclusion is that last generation of hoses specifically dedicated to LNG are safer than arms. ANNEX C: 'Requirement for use of the frequency and calculation of hardarms and hoses scenarios'
69	BEAG	App Vol 7 QRA 2.6 the Dolphin is omitted so is Has Saptan whereas before it was stated that the Dolphin will have to be reallocated. Now the Dolphin effects are not taken in consideration	Reference is made to the response in row 10 (on page 4).
70	BEAG	Roll-over phenomena which can happen when LNG separates with the consequence that heavy gas floats on top of other gasses causing Roll-Over.	Roll over phenomenon is prevented by analysis of LNG unloaded and proper storage
71	BEAG	Please identify UTM, not in Glossary	Universal Transverse Mercator
72	BEAG	LNG has high safety records compared to refineries, and petro chemical plants. Yet it is reported that LNG vapour releases and miner fires and explosions have been reported. The fact is that LNG, unless handled properly by Enemalta employees and administered sensitively and with cautiously, it could be fatal due to nature of the substance and behaviour. Another reason why the FSU should be outside harbour.	the nature and behaviour of the substance itself must not be a reason enough to discard a project, without taking into consideration the engineering efforts for a safer world
73	BEAG	Use of mobile phones, the commonest way of communication can, ignites LNG vapors. Besides all three gases are cryogenic particularly to the lungs and can cause other body hazards. It can also have fracture effects to metal and concrete.	Use of mobile phone would be restricted within the fence and close to the FSU. LNG can cause cold burn if touched or spilled on the body. This hazard is strictly for plant personnel, trained and prepared (always wearing gloves when taking samples). material used for the construction must be able to stand the cryogenic temperature when in contact with LNG
74	BEAG	Raped change Transitions, BLEVE, use of mercaptan are not considered as QRA yet, still the negative effects are not considered in this chapter.	RPT and BLEVE are phenomena with a very low probability, which can be completely removed from the facilities if properly designed and managed. Use of mercaptan is not an hazard, in fact can be introduced for safety reasons in order to make natural gas detectable by smelling, as propane gas
75	BEAG	Vulnerable Targets:- Population zones, Birzebbuga is not considered in the study. We are hereby giving calculated distance from proposed FSU tanker.	Birzebbuga is out of any contour studied in the QRA report

Comments of the public regarding the 3rd draft of the EIS concerning the proposed CCGT Plant and LNG Facilities at the Delimara Power Station

No	Comment submitted by	Comments	Responses of EIS Coordinator
76	BEAG	Other considerations:- Workers at Malta Freeport Terminals were not considered even though they are closest to FSU. Wind speed and direction are not mentioned in the report. Distances quoted may vary according to wind speed and direction. If this is not in the MEPA TOR than the expert should have requested further investigations, more so when the expert is a non resident in Malta. Specialised software can only give actual results if data input is correct, garbage in = garbage out	Wind speed and direction are mentioned in the report and have been provided by official meteorological service. Distances presented are according to low wind speed for any possible direction, thus are presented for the worst meteorological condition
77	BEAG	Distance of stand by ships and ships entering the Marsaxlokk Bay were never considered.	Safety distance between third ship and moored LNG would be set as a result of the marine risk assessment
78	BEAG	Major Accident Scenarios Process Hazard Analysis techniques must be used such as HAZID & HAZOP, these are generally related to the control. It seems that the Domino effect was calculated on the in-house DPS, FSU and Re gasification unit. No other elements were taken in consideration such as the Dolphin and MFT ship movements and fisherman going in and out of Marsaxlokk Bay	Detailed HAZOP, LOPA and SIL are carried out for any LNG project in further stages of the engineering. Complete domino effect should be taken into account from a general perspective for the whole port area and led by the port authority or MEPA
79	BEAG	At the public hearing we asked about the mercaptan. When will this substance is added to the LNG. If there is a danger of flexible hoses as suggested by Electrogas to frequent failure with consequences of frequent undidected gas clouds. Is it going to be a normal occurrence? Please consider table on page 20 SGS on QRS Presentation of Resulting Risk Comparison. EIS does not refer to the addition of mercaptan. We still want to know at what stage is the mercaptan is added to the gas.	Use of mercaptan is not a hazard, in fact can be introduced for safety reasons in order to make natural gas detectable by smelling, as propane gas. Mercaptan must be added after regasification takes place. QRA Report includes an Annex with a comparison between arms and hoses, and the conclusion is that last generation of hoses specifically dedicated to LNG are safer than arms.
80	BEAG	Please identify Toxic Release and Other Hazardous release. Gas explosion is said to be rear, yet it is quoted that deflagration mode is most common due to the subsonic speed. All these can create BLEVE, whereas Dr. Vaccari said that there is question of bleve at the public hearing, please clarify. Again like all experts involved in the EIS, Dr. Vaccari put the benefit of the doubt on to the Contractor, see Conclusions Chapter 12. Dr Vasccari also state that the suggest position may not be suitable from the nautical point of view and recommends a nautical risk assessment on. Another recommendation is that HazID are expected to be studied and applied. All these covers the responsibility of Dr Vaccari in a way as in a case of an accident, he would not be blamed for he has instructed suggestions.	No toxicity in the LNG or natural gas. BLEVE are phenomena with a very low probability, which can be completely removed from the facilities if properly designed and managed. Suggested position of the FSU in the QRA report, for obvious reasons, should be agreed by nautical experts, SGS has not been requested to assess this project from a nautical point of view.
81	BEAG	Please note Annex A HAZID - Layout = possible collision or domino effect in case of Accident. Same Annex A, when referred to domino effects no safeguards are given and no commendations given.	Any possible domino effect must be prevented by introduction of Emergency shutdown systems, gas detection, firefighting system, etc. Recommendation would be present in the further studies, based on detailed lay out.