PROJECT DESCRIPTION STATEMENT

Delimara Gas and Power

Combined Cycle Gas Turbine
and
Liquefied Natural Gas
receiving, storage, and regasification facilities

Enemalta Corporation

31 May 2013

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GLOSSARY

ACC	air condensed cooler
CCGT	combined cycle gas turbine
DPS	Delimara Power Station
EIA	Environmental Impact Assessment
EMSA	European Maritime Safety Agency
END	Environmental Noise Directive
ETD	Emissions Trading Directive
FSRU	floating storage and regasification unit
FSU	floating storage unit
GT	gas turbine
HFO	heavy fuel oil
HRSG	heat recovery steam generator
IED	Industrial Emissions Directive
IMO	International Maritime Organization
IPPC Directive	Integrated Pollution Prevention and Control Directive
kV	kilovolts
LCP Directive	Large Combustion Plants Directive
LNG	Liquefied Natural Gas
MARPOL	marine pollution
MEPA	Malta Environment and Planning Authority
MMBTU	Million British thermal units
MRA	Malta Resources Authority
MSFD	Marine Strategy Framework Directive
MW	megawatts
NEC Directive	National Emission Ceilings Directive
NOx	nitrogen oxides
OHSA	Occupational Health and Safety Authority
PV	photovoltaic
TWh	terawatt hours
WFD	Water Framework Directive

1 INTRODUCTION

Malta has no indigenous mineral primary energy sources and therefore relies on imported fuels, mainly heavy fuel oil and light distillate, for generation purposes.

Enemalta Corporation is the main producer of electricity in Malta with the exception of a small contribution from relatively small producers generating electricity from renewable energy. Malta is currently not interconnected to any other country. The total electricity load in Malta in 2012 was 2.269TWh. This demand was mostly met by twoEnemalta-owned power stations using heavy fuel oil (HFO) and gasoil.

The current fossil fuel generation capacity is 620MW distributed across the two power station sites owned by Enemalta. Thisincludesa new power block with a capacity of 149MWwhichcommenced operation at the end of 2012. In addition a 200MW interconnector to Sicily is currently under construction and is projected to be completed by the end of 2014. The remaining operational 2x steam turbine generators at the Marsa B station, with a total nominal capacity of130MW are due to be shut down by the end of 2015 under the terms of the Large Combustion Plant Directive. In addition, the Government of Malta has committed itself to shut down the 2x60MW steam turbine generators of the Delimara 1 power plant once sufficient replacement capacity is available.

A policy decision has been made by the Government of Malta that, from spring 2015, base load electricity should be sourced by Enemalta from an independently-owned, state of the art, high-efficiency power plant powered by natural gas. This power plant is expected to be based on an advanced design *Combined Cycle Gas Turbine*(CCGT)plant.The gas is to be sourced by the independent owner of the CCGT Plant from an adjoining gas supply plant which is expected to be a *Liquefied Natural Gas* (LNG)Plant, which is also to be built and operated by an independent investor.

Until a few years ago, the percentage contribution of renewable energy technologies in the electricity generation sector was non-existent. Since 2006, there have been some changes, mainly attributed to installation of small grid-connected *solar photovoltaic* (PV) systems. As of 2012, the total installed capacity of smaller embedded generation capacity was 16.5MW. This includes small scale solar PV, wind and energy from waste.

2 JUSTIFICATION FOR PROPOSED PROJECT

2.1 European Union directives on emissions

After entry into the European Union, Malta became subject to a number of environmental directives related to combustion plant.[1]Currently these include:

- The *Industrial EmissionsDirective*(IED) (*Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)(recast)*,which is transposed into the Maltese Law through Legal Notices9 to 14 of 2013).

  This recently transposed directive, was intended to bring together the *Integrated Pollution Prevention and Control Directive* (IPPC Directive) (*Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control*) and the *Large Combustion Plants Directive* (LCP Directive) (*Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants*) both of which provide the framework for the operations of power stations, as well as another five directives which are concerned with titanium dioxide, volatile organic compounds, and waste incineration. Under the IED, the IPPC Directive will be repealed in 2014 and the LCP Directive in 2016.[2]

- The *National Emission Ceilings Directive*(NEC Directive) (*Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain environmental pollutants*; which is transposed into Maltese Law throughLegal Notice 291 of 2002).

- The *Emissions Trading Directive*(ETD) (*Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC*; which is transposed into Maltese Law throughLegal Notice 140 of 2005).

Under the LCP Directive, Marsa B Power Station steam plant is defined as 'existing plant' according to the LCPD since it was commissioned before 1st July 1987. There are two boilers (Boilers 7 and 8) still in operation and both utilise heavy fuel oil containing 0.7% sulphur as their primary energy source. This Directive states that, in the case of such plants, there are the following alternatives:

- Modify such plant to meet the 'new plant' emission limits by 1st January 2008.
- Ensure that 'existing plants' are subject to a national emission reduction plan.
- Exemption from compliance of any of the two alternatives above can be granted if the operator declares not to operate the plant for more than 20,000 hours starting from 1st January 2008 and ending no later than 31st December 2015.

Notes

1 In this document, references to legal documents such as Directives, Regulations, and Legal Notices are made to the principal enactments or issues together with all subsequent modifications entered to date.

2 Industrial Emissions, 2011, European Commission
Retrieved from http://europa.eu/legislation_summaries/environment/air_pollution/ev0027_en.htm

Enemalta Corporation has taken a policy decision to abide by the third alternative above and therefore all the presently installed steam plant is to be decommissioned by31stDecember 2015 at the latest. This will effectively result in the reduction of approximately 130MW of low efficiency generating capacity.

2.2 Electricity demand and supply

Figure 2-1(below) shows historical load and gross generation in Malta respectively.[3]This data includes Enemalta's own internal power consumption and should therefore be compared with gross rather than net consumption.

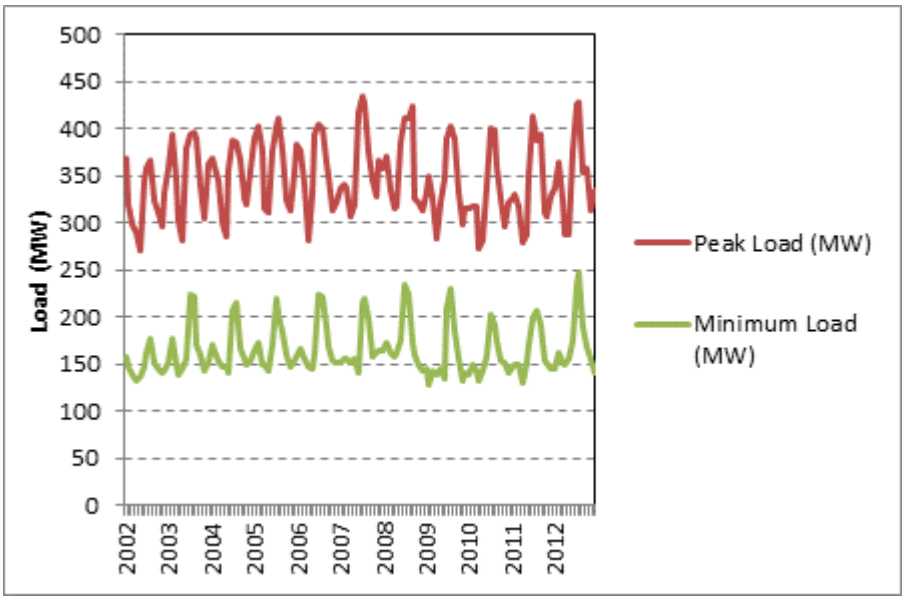


Figure 2-1: Historical Minimum and Peak Load in Malta

In the five years from 2002 to 2007, annual peak load increased at an average of 3.4% (equivalent to 13MW) per year. However in the following 3 years to 2010, the annual peak load dropped by an average of 2.7% per year before increasing again until 2012 at a rate of 3.6%.This reduction in load was accompanied in 2009 by a contraction in GDP in Malta after 8 years of continuous growth, as well as significant increases in electricity prices.

Since 2009, GDP has continued to grow and continued growth is projected by the European Commission[4]. SimilarlyFigure 2-2(on page 9) shows that total consumption of electricity in Malta has tended to recover since 2010.

As can be seen from Figure 2-3 (on page 9), per capita electricity consumption in Malta is relatively low by EU standards, even compared to other warmer south European countries. It is evident that there is still room for electricity consumption to continue to grow.

Notes

3 Data source: Enemalta

4 European Economic Forecast, Autumn 2012, European Commission
Retrieved from: http://ec.europa.eu/economy_finance/publications/european_economy/2012/pdf/ee-2012-7_en.pdf

Figure 2-2: Annual Gross Generation in Malta

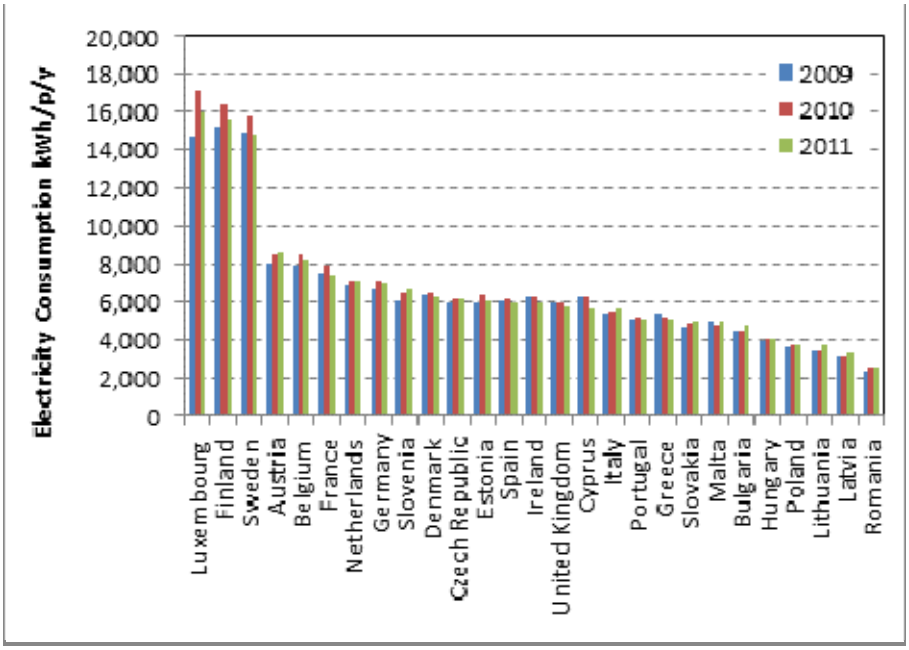


Figure 2-3: Electricity consumption in Malta compared to other EU countries[5]

Some of the increases in consumption are likely to be offset by increasing domestic and commercial solar PV, which directly supply the building on which they are mounted, and by the increasing uptake of low-efficiency appliances. Enemaltahas estimated an increase in electricity consumption of 2% in 2013, and estimates 1% thereafter.Table 2-1 shows the electricity supply capacity situation in Malta. In addition to the generation capacity shown at Table 2-1 (on page 10), there is approximately 16.5MW of smaller embedded capacity, including small wind and solar PV projects and energy from waste.

Notes

5 Data source: Eurostat

Table 2-1: Existing Large Electricity Supply Capacity in Malta

Power station block	Generation equipment	Gross supply capacity (MW)	Fuel	Year completed
Marsa B 7-8	2x Steam Turbine Generators	130	HFO	1964-1987
Marsa B GT1	1x Gas Turbine	37	Gasoil	1990
Delimara 1 – ST	2x Steam Turbine Generators	120	HFO	1992
Delimara 2A– GT	2x Gas Turbines	74	Gasoil	1996
Delimara 2B	CCGT Plant- 2x GT, 1x ST	110	Gasoil	1998
Delimara 3	8x Internal Combustion Engines	149	HFO	2012
Total		620		

The total nominal supply capacity of 620MW does not consider the de-rating of capacity resulting from high ambient temperatures during the Maltese summer. The hottest months of July and August tend also to be the periods of highest peak load, due to air-conditioning use and the large seasonal tourist population.

Table 2-2 shows the proposed electricity supply situation as of 2016. By this time, the following principle changes are planned in Malta:

- Decommissioning of the remaining Marsagenerators.
- Decommissioning of the Delimara 1steam turbine generators.
- Conversion of Delimara 3 to operate on natural gas.
- Completion of the 200MW interconnector to Sicily.
- Construction of a new 180-220MW CCGT at Delimara (independent).
- Construction of an LNG terminal in order to supply natural gas to Delimara 3 and to the Independent CCGT plant.

Table 2-2: Future Situation – Electricity Supply Capacity in Malta

Power station block	Generation equipment	Gross supply capacity (MW)	Fuel	Year completed
Delimara2A– GT	2x Gas Turbines	74	Gasoil	1996
Delimara 2B	CCGT- 2x GT, 1x ST	110	Gasoil	1998
Delimara 3	8x Internal Combustion Engines	149	Natural Gas	2012
Interconnector	Interconnector to Sicily	200	N/A	2014
Independent	CCGT	Approximately 180-220	Natural Gas	2015
Total		~733		

The development of installed capacity in Malta has been plotted in Figure 2-4based on existing plant, new constructions and plant to be shut down. In addition to this, the graph also shows a line depicting 'Single Largest Failure' plus 10% derating. This assumes a scenario where the largest single power supply becomes unavailable whilst remaining plant is derated by 10% due to high ambient temperatures. From 2014, the potential Single Largest

Failure will become the 200MW interconnector. This is compared in Figure 2-4with the increase of electricity consumption which is anticipated by Enemalta.

It can be seen from Figure 2-4, that depending on Enemalta assumptions on annual increase, additional capacity in Malta may be required beyond the year 2020 in order to meet potential demand whilst retaining the ability to react to non-availability of large supply sources.

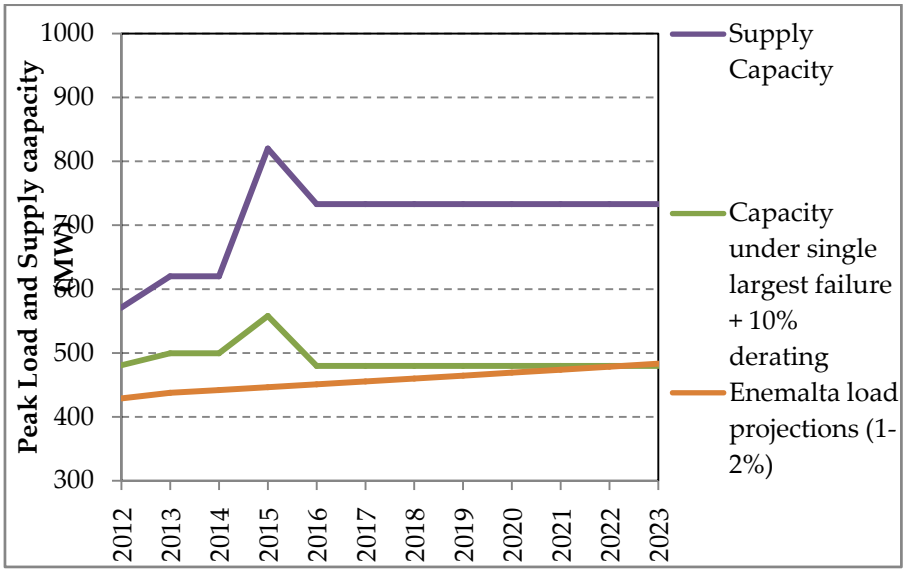


Figure 2-4: Peak load scenarios and proposed supply capacity[6]

Notes

6 Data source: Enemalta

3 DESCRIPTION OF THE PROJECT

3.1 CCGT

The *Combined Cycle Gas Turbine* (CCGT) is a form of power plant where power is generated by burning fuel and passing the resulting gas through a *gas turbine* (GT) which drives a generator. The exhaust gas coming from the gas turbine is then passed through a heat exchanger in order to make steam. The steam is then passed through a stream turbine which also drives a generator.This type of power plant has the following properties which make it an attractive form of power generation for Malta:

- It is highly efficient and environmentally friendly.
- The technology is state of the art and advanced.
- It is a proven method of per generation with many examples around the world.

For the purpose of the permitting process, it is assumed that from spring 2015, Enemalta will procure base load electricity in Malta from an independently-owned, state of the art, high-efficiency *combined cycle gas turbine power plant* (CCGT Plant). To meet Enemalta's needs under the Energy Agreements, this power plant shall have a gross design capacity of between 180MW and 220MW at ambient conditions at maximum continuous rating (MCR) and design fuel. The expectation is that the power plant will run on base load during day time decreasing to 160MW load or lower during night time. The plant shall be capable of stable, sustained operation from 100% MCR down to this level. TheCCGT Plant shall be configured to operate exclusively on natural gas.

3.2 LNG receiving, storage, and regasification facilities

Liquefied Natural Gas (LNG) is natural gas which has been converted to its liquid form by cooling at atmospheric pressure. LNG is approximately 600 times denser than natural gas, which allows it to be transported more efficiently by ship. LNG must be stored in insulated and cooled tanks until it is ready for regasification and use.

An *LNG receiving, storage and regasification facility* (the LNG Plant)shall be independently owned, constructed and operatedclose tothe CCGT Plantlocation. The LNG Plant shall have the capacity to supply and regasify sufficient annual quantities of LNG in order to meet maximum instantaneous needs of a combination of the following:

- The current 149MW Diesel Engine Plant (Delimara 3)post natural gas conversion.
- The proposed new Independent 180-220MW CCGT Plant.

The total storage capacity of the LNG Plant would be dependent on the frequency and size of LNG deliveries. If LNG is to be stored on a floating platform, this may take the form of a converted LNG tanker and the size of tanker to be used would be dependent on what is available on the market.It may be necessary to maintain up to 180,000 m3 of storage capacity at the site.

3.3 Onshore and floating options

The LNG Plant may be situated on a *Floating Storage and Regasification Unit* (FSRU) to be moored adjacent to or close to the Delimara Power Station However, as an alternative, Enemalta may allow an LNG Plant to be constructed onshore on site B.Alternatively a hybrid solution may be sought, with a *Floating Storage Unit* (FSU) offshore and regasification onshore. The FSRU or FSU may be a new-build or a conversion of an existing LNG tanker.

3.4 Balance of plant

The new generating plant will be connected to the electricity distribution network at the 132kV switchboard at Delimara Power Station. The connection will generally be regulated by the Network Code. Enemalta may provide auxiliary electrical supplies to the new plant, depending on availability.

The existing station utilises a 'once through' direct sea water cooling system and it is anticipated that the main cooling water infrastructure may be utilised by the new plant. Under this system, cooling water is taken from MarsaxlokkBay and discharged on the other side of Delimara peninsula at il-Ħofraż-Żgħira.

The possibility that cooling may be provided via an *Air Condensed Cooler* (ACC), or a mechanical or natural draft cooling tower were also considered, but are not favoured for the following reasons:

- ACC – large physical footprint and reduced effectiveness in hot weather.
- Natural draft – large structure which would be visually intrusive.
- Mechanical draft – increased noise levels.

In all types mentioned above, the power station would be likely to suffer a loss of efficiency.

3.5 General

The CCGT shall be located in close proximity to the LNG Plant. The successful bidder will be required to consider options for enhancing the cooling of power generators on site by use of the cooling effect of the LNG re-gasification process.

Total construction time for the CCGT and the LNG Plantis not expected to exceed 18 months and the target date for both facilities to be fully commissioned and put into commercial operation is April 2015.

The CCGT plant is to operate in parallel with other installed electricity generating units at the power stations in accordance with the prevailingNetwork Code issued by Enemalta.

The CCGT and LNG plants shall be configured and arranged so as to fit into the land or seaarea available. Land reclamation may be required in certain areas to enable the construction of the LNG terminal.All new construction will be in compliance with all relevant licences and permits.

The plant shall be built with due consideration to the following:

- Prevailing health and safety regulations.
- Prevailing environmental requirements.
- Design features to be compliant with permitting and regulatory requirements.

- Applicable Codes and Standards.
- Maintenance and operating requirements of co-dependent infrastructure.
- Prevailing hazard and emergency planning for the site and any future requirements which will be imposed as a result of these new construction works.

Safety is to be considered as a vital requirement. Any proposed plant is to meet all current European Union and Maltese safety standards and regulations as well as any such legislation that can be expected to come into force in the near future.

The height of the CCGT Plant exhaust stack(s) shall take into consideration the presence of a public road and residences sited at 45m above sea level on the eastern boundary of the station and the close proximity of urban areas.

During the design phase, due regard is to be given towards the site topology, adjacent plant and residential areas and particular attention to be paid to the exhaust gas outlet.

All construction works should, as far as possible, visually match the existing structures and surroundings so as to ensure the good general visual appearance of the station.

Given the strategic importance of the LNG Plant and the CCGT Plant to Enemalta's security of supplies and its economic and environmental performance, the proposed Energy Contracts with the independent owners will require that the owner demonstrates rigorous performance in itsdesign, build, own and operate obligations, including its obligations relating to health, safety and environmental matters.Enemalta will have monitoring rights and recourse to action in the event of under-performance by the independent company.

3.6 Fuel considerations

All fuel to be consumed by the CCGT Plant will be supplied through the LNG Plant. The CCGT Plant shall operate at base load. As such it is assumed that the new CCGT Plant may consume up to 1,467MMBTU (~44,459 m^3) of natural gas per hour at steady state operation. A maximum daily capacity of up to 35,212 MMBTU (~1,067,025 m^3) may be assumed. The actual amounts are dependent on air pressure, temperature and humidity.

In addition to this gas will be supplied to Delimara 3 by the LNG Plant. At base load this would consume up to 1,089MMBTU (~33,086m^3) of natural gas per hour. This would equate to a maximum daily capacity of 26,204MMBTU (~794,065 m^3) over a 24 hour period.

In reality it is unlikely that Delimara 3 and the new CCGT will both operate at base load for any significant period of time. In fact Delimara 3 is expected to have a utilisation rate of less than 50%, resulting in an average daily natural gas consumption of less than 13,102MMBTU (~397,033m^3). This means that the expected average daily natural gas consumption would be up to about 48,314MMBTU (~1,464,058m^3). This equates to approximately 2,440$m^3$of LNG per day.[7]

The m^3 volumes of gas shown here assume a Lower Heat Value of ca. 0.033 MMBTU/m^3 of natural gas at atmospheric pressure.

Notes

7 Note that 1m^3 of LNG equates to approximately 600m^3 of natural gas

3.7 Other reagents

Modern gas-fired CCGT power stations operate normally at very low rates of emissions and additional abatement technology may not be required. However in the event that there is the need to reduce the *nitrogen oxides* (NOx) levels of the flue gas emissions, this can be achieved by use of appropriate abatement technology. Such abatement technology could make use of reagents such as urea or ammonia. This type of NOx abatement is currently used at Delimara for existing power plant.

4 SITE SELECTION

4.1 Siting criteria and choice of location

When considering the potential location for the CCGT and LNG plant, the following factors need to be considered:

1. The CCGT and LNG plants should be located in a port area. There are a number of reasons for this:
   a. The CCGT Plant will require cooling water. This water is pumped from thesea and returned back through the existing arrangements. This will necessitatemonitoring and will be carried out under established policies and regulations.
   b. The construction equipment for the main fuels and supplies (equipment itself) are provided for by means ofships as the items are extremely bulky and difficult or cumbersome totransport over land. Depending on the chosen plant, single loads of at least 100 tonnes may be expected during the construction phase.Therefore a port facility is not just necessary, but imperative.
   c. LNG will be delivered by tankers, which will require port facilities with sufficiently deep water in order to come alongside and discharge.
2. The proximity to the existing infrastructural network is equally important. Unless theelectric power produced can be fed into the existing grid, it cannot be harnessed. The132 kV in Malta is generated from Delimara Power Station and fed to existingdistribution centres, notably at Marsa (industrial estate) and Mosta.
3. The plant has to be sited at the least environmentally inconvenient area. Althoughpollution control measures will be featured in the plant, and although mitigatingmeasures will be taken to further ensure this, the site selected should not prejudice areaswhich are yet unspoiled by industrial development or are established touristic zones.All siting solutions have financial implications. It is obvious that the less costly oneshould be adopted as this will have socialrepercussions on the price ofelectricity.
4. Since the CCGTPlant is to emit exhaust gases, the location also has to be chosen such thatthese gases do not affect visually or otherwise any other activities. Since theprevailing winds in Malta are generally from the north-west, the site in this regardshould be chosen in the south east of Malta.The site should also be free of archaeological finds, and should be insensitive to agricultural and other ecological issues.

This implies that there are only two feasible sites,namely

- Marsa Power Station
- Delimara Power Station

Marsa is within a heavily residential area which raises social issues, and spatially it would also be difficult to accommodate the plant required.

Therefore all efforts of study will be concentrated at Delimara as it is seen as the only potential site with already established similar activities and already planned to cater for such development.

4.2 Delimara Power Station Site

Delimara Power Station (DPS) is the site earmarked for the installation of the CCGT and LNG plants (see appendices A and B). Enemalta will make available an area of land at the location of the existing Delimara Power Station which may be used by the owners for the CCGT Plant and the LNG Plant Two separate plots of land could be made available for building at Delimara. These are shown as area A and B in Appendix C.

Both areas are within the power station's boundary and have been designated for a power station development in the Marsaxlokk Bay area plan of 1995.

In the event that a successful Bidder proposes to locate the LNG Plant on an FSRU, an area of sea at or close to the shoreline will be made available to the successful Bidder for the purposes of mooring the platform. This area is likely to be immediately in proximity to area B. Its precise location will be dependent on the physical characteristics of the FSRU to be used.

Other areas, all within the DPS complex, may be required for the installation of equipment that may be necessary for the safe and reliable operation of the Plants.

Note that, if any material is any excavated from the land at area B, it will most likely be necessary to underpin the fuel tanks which are currently located in that area in order to prevent subsidence.

The site is subject to occasional heavy localised pollution where the atmosphere canbe laden with dust or sea spray or both. Therefore all plant is to be suitably protectedagainst the effects of such conditions. The semi-tropical conditions under which theplant will operate are also to be noted.

4.3 Project options

The location of the CCGT Plant and the LNG Plant within or close to the DPS power station site is dependent on a number of different factors. These include the following:

- Land areas available for use.
- Sea areas available for use.
- Dimensions of the CCGT and LNG plants.
- Location of existing equipment at the DPS site; including existing generation and ancillary equipment and connections between these.
- Existing roads and buildings at the DPS site.
- Safety distances between proposed new and existing equipment at the DPS site.
- Availability of suitable locations for the FSRU or FSU and use of resupply vessels; including quay lengths, water depth, approach channels and considerations of other harbour traffic.

Based on these considerations, two possible options for the location of the CCGT power station at the Delimarasite have been identified (Appendix C):

1. Area A
2. Area B

Three options have been identified for the LNG facilities:

1. On-shore Regasification and Storage at Area B.
2. *Floating Regasification and Storage Unit* (FSRU); to be moored at a new jetty at area B.
3. *Floating Storage Unit* (FSU); to be moored at a new jetty at area B, with re-gasification equipment ashore.

All options would require additional works at sea such as construction of a jetty, dolphin, and so on. It may also be necessary to reclaim some land close to area B.

4.4 Land and sea use around Delimara Site

The main land use around the site is agricultural although there are a few residential units as can be shown on the plan in Appendix A. From an aerial survey, the fields appear to be more of a dry arable land type. Being so close to the sea and so exposed to the wind, only marginal crops (two seasons) can be cultivated.

In 1990, this area was deemed to have complex cultivation patterns whilst in 2000, thisarea was reduced in size and termed agriculture with significant areas of naturalvegetation.[8]

Further to this (and attached to this document) the site is surrounded by terrestrialenvironmental designations as per MEPA web site. These sites show terrestrialhabitats such as salt marsh, woodland, trees and shrubs, and maritime garrigue. Theyalso show the environmental protection zones such as SAC (or potential) andecological importance.

Marsaxlokk Bay is also the location of the Malta Freeport at Kalafrana. The CCGT/LNG option to be chosen will consider the impact of existing and future traffic in the Harbour. It may be necessary to remove or relocate the existing Ħas-Saptan re-fuelling dolphin in order to facilitate the movement of ships in Marsaxlokk Bay.

Notes

8 Scheduled Property, Environmental data, 2013, MEPA
Retrieved from: http://www.mepa.org.mt

5 ISSUES AND MITIGATING MEASURES

5.1 Visual

5.1.1 CCGT Plant

The CCGT plant shall be housed at area A or area B within a shed similar to the ones already existing on site.The shed will be in the order of 25-35m high (similar to the present plant) and caneasily be integrated in the existing complex which is industrial in appearance.

The length and width of the complete CCGT unit will depend on the configuration of the power plant and the type of cooling to be used. The CCGT with the smallest footprint would be a direct cooled power plant.

These are typical sizes for the main components and buildings:

- Gas Turbine Generator ..... 800m^2 = 20 x 40 meters
- *Heat Recovery Steam Generator* (HRSG)..... 875m^2 = 25 x 35 meters
- Steam Turbine Generator building .....1,350m^2 = 45 x 30 meters
- Step up transformers.....2x225m^2 = 2 x 15 x 15 meters

The entire complex could require an area of up to approximately 7,125m^2.

The layout shall vary depending on the supplier design, plant configuration and local factors. The CCGT Plant would be equipped with one or more chimneys.The height of these chimneys is not expected to be less than 75m.

It is planned that the 150m Delimara 1 chimney will be decommissioned upon completion of the planned CCGT.

5.1.2 LNG Plant

The LNG unloading system will comprise a wharf, berth and unloading arms. Unloading facilities with sufficient water depth will be required in order to allow LNG tankers to come alongside and discharge their load implying that potential land reclamation and dredging might be required. This may take the form of a jetty constructed at area B with cryogenic pipes leading onshore. Such a jetty may be necessary in order to maintain a safe distance between the LNG unloading vessel and any storage tanks. LNG flows from the ship through the unloading arms and unloading lines into the storage tanks. The loading lines can be two parallel pipes or a single larger pipe. It is customary to have three unloading arms for LNG and one arm for return vapours, but the number may be reduced should hydraulics and flexibility in unloading time permit.

The size of a jetty will be dependent upon the size of the LNG tankers which will supply the site. These may be up to 300m in length and with a draft of up to 12m. Up to 180,000 m^3 of storage tanks may be required to store the LNG prior to regasification. This will be the largest single item within the LNG re-gasification facility.

5.2 Environmental – neutralizing and disposal

5.2.1 Construction phase

During construction of the proposed facilities petroleum products and chemicals will need to be delivered to Delimara to support the operation of heavy equipment, electrical generating equipment and the construction process. This will include fuel oil, lubricating oil and other chemicals. All storage locations will be equipped with secondary containment and fire prevention systems in accordance with good engineering practices.

During the construction phase, depending on the solution to be followed, excavation waste may need to be dealt with. This may include a portion of the mound which currently covers area B.Some of this waste may be used to reclaim land in front ofor to the side of area B in order to build a jetty to receive LNG tankers.The remainder is expected to be disposed of in authorised landfills.

The types, sources, and management of wastes anticipated to be generated during the construction of the proposed project facilities are as follows:

- Combustible wastes, such as scrap wood, cardboard, paper, and land clearing wastes (trees, brush, and so on).
- Bulky construction wastes, such as concrete, clean fill material, scrap metal, glass, and plastics will be generated during construction of the proposed project.
- Special wastes, such as hazardous waste, industrial solvents and other chemical wastes, grease trap pumpings, lead acid storage batteries, and used oil, will be generated during the construction and operational phases of the proposed project.
- Sanitary waste.
- Shipboard waste.

5.2.2 Operation phase– CCGT Plant

Any additional emissions to air or water from the proposed new equipment will be considerably smaller than the existing DPS 1 block, which will be phased out after the implementation of this project.

The new CCGT Plant will need to make separate arrangements for the handling of any solid waste generated.It is expected that solid wastes mayalso be produced and that these will have to be disposed of. In this case, a contractor will befound to handle such disposal issues. The expected amount of solid waste generated daily is expected to be very low, mainly depending on the load cycle, amount ofpower output and the fuel consumption. If this waste is treated such that it isneutralised, this waste shall be disposed of locally, otherwise, if the solid wasteproduced is to be considered as hazardous waste,this waste will have to be exported.

5.2.3 Operation Phase – LNG Plant

During facility operations, gasoil and certain chemicals will be delivered to Delimara. The following is an overview of likely activities involving petroleum and chemical materials on in Delimara during operation of the LNG Plant:

- Gasoil storage
- Oil/water separator
- Gasoil transport
- Chemical storage
- Lube and hydraulic oil storage

5.3 Social disturbance:short term

It is expected that the construction phase with all its nuisances is not intended to last more than 18 months.No onshore external (outside of DPS) works are expected, although the potential of increasing the boundary of DPS is possible through further land reclamation, as previously stated. Any stock piles can be accommodatedon site. Also, being a port, certain items can be brought directly to site via the sea.

Therefore the amount of nuisance will be from passing heavy plant (cranes, trucks, and so on) to and from plant. Some of the plant utilised will be parked on site.

5.4 Social disturbance:long term

Noise from the operating plant is not expected to be significantly higher than the existing noise levels heard at the power station. A relatively negligible amount of newcompetent staff is expected to be employed, as these units may be computer operated fromthe existing control rooms. This implies that the parking provision does not need to beincreased and that there will not be any additional significant traffic generation to andfrom Delimara.

There will be a need for regular LNG shipments to the site. This will however be offset by a reduction in HFO shipments. The LNG re-supply tankers may however be considerably larger than the oil tankers which currently serve the site. Conversely however, larger tankers will need to visit the site less frequently.

6 CUMULATIVE IMPACTS

Delimara Power Station, being the designated area, has already been earmarked for development of electricity generating machines. Cumulative impacts of this development include the visual impact of an increase in the number of engine sheds and stacks and the addition of LNG storage tanks or vessel, as well as the LNG re-gasification equipment. Conversely, subsequent to the proven safe operation of the new CCGT and LNG terminal, it is planned to shut down and decommission the DPS 1 block, including its 150 m stack.

There shall also be an effect on the total airborne and noise emissions from site. The new CCGT will have significantly lower emissions than the DPS 1 block for the same amount of electricity produced.

If an FSRU or FSU solution is to be used, its precise dimensions will depend on its design. However typical dimensions for a vessel with 180,000 m3 storage may be a length of up to 300 m and a beam of up to 52 m. It might have a draft of 12 m, a free-board of 20 m and superstructure of approximately 25 m above the free-board. This could be moored indefinitely at a location close to the power station. This ship will include upon its upper deck the equipment required for the re-gasification of LNG. Gas will be stored in tanks which are incorporated into the hull of the ship. In this variant however, relatively little new equipment will need to be installed onshore. If an FSU is to be used, regasification equipment will be installed ashore or on the new jetty. This equipment is however relatively small compared to the other industrial equipment at Delimara.

The FSU or FSRU would be equipped with its own generator, which would be capable of producing power for its own use. The vessel would however ordinarily be connected to shore supply and would accept power from the Enemalta grid. As such, there should be no additional emissions from the FSRU during normal operation.

7 REGULATORY FRAMEWORK

7.1 Legislation and policy

There are various documents which present the regulations and policies within which the development should be framed. The principal documents which have been consulted are:

7.1.1 Land use and environment

Environment and Development Planning Act (Chapter 504 of the Laws of Malta)

This act provides for the setting up and operations of the *Malta Environment and Planning Authority* (MEPA) and for the framework for the formulation and implementation of land use plans and environmental regulations, which need to be referred to in the planning and design of the CCGT and LNG plants.

Structure Plan for the Maltese Islands, 1990

There is no direct reference to the expansion of the DPS. This reflects the concerns of the time, which was the routing of the 132kV. However in the preamble of the Powertopic within the Public Utilities section of this plan, the opening statement declares "It is unlikely that thenew electricity generating plant at Delimara will cater for all the demands in theislands until the year 2010. …" This implies that the need was already envisaged andhence would be recommended.

Marsaxlokk Bay Local Plan, 1995

Policy MD04 defines DPS an industrial site with a visual impact problem and would require landscaping and screeningPolicy MD05 allows development not necessarily related to the power station to besited to the "south" for storage subject to operational requirements of DPS and therespect of the environmentPolicy MD06 (Quoted in full): "No measures to expand the power station or otherrelated works requiring a development permit will be agreed by the PlanningAuthority[9] unless it is persuaded that Enemalta will take adequate measures to dealwith existing and proposed cooling effluent and smokestack emissions to ECstandards. Such measures will be subject to independent scientific verification, atEnemalta'sexpense".

Assessment and Management of Environment Noise Regulations (Legal Notice 193 of 2004)

These regulations provide the framework for the avoidance, prevention, or reductionof theadverse effects and annoyance resulting from exposure to environmental noise. These regulations transpose into Maltese Law the *Environmental Noise Directive* (END) (*Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise*).

Notes

[9] The functions of the Planning Authority have since been taken over by the MEPA

Flora, Fauna and Natural Habitats Protection Regulations (Legal Notice 311 of 2006)

The above-mentioned EIA process will need be complemented by an Appropriate Assessment, given the presence of species/habitats protected under these regulations. These regulations transpose into Maltese Law the Habitats and Birds directives (*Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora* and *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version),* respectively)

Environmental Impact Assessment Regulations (Legal Notice 114 of 2007)

It is expected that a full EIA process may be required for this development. These regulations transpose into Maltese Law the EIA Directive (*Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification)*)

Ambient Air Quality Regulations (Legal Notice 478 of 2010)

These regulations provide the framework, among other things, for the assessment of air quality, the ensuring of the accuracy of measurements, and the analysis of assessment methods. They transpose into Maltese Law*Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air* andtheAir Quality Directive (*Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe).*

Waste Regulations (Legal Notice 184 of 2011)

This legal notice regulates the management of different types of wastes, including hazardous ones, such as waste oils. Among other things, they provide for the protection of the environment and human health through the prevention or reduction of the adverse impacts of the waste generation and management. This legal notice transposes into Maltese Law the Waste Framework Directive (*Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives*)

Marine Policy Framework Regulations (Legal Notice 73 of 2011)

Through this legal notice the *Marine Strategy Framework Directive* (MSFD) (*Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy*) is transposed into Maltese Law. This Directive establishes a framework for the formulation and realisation of measures by Member States designed to achieve or maintain good environmental status in the marine environment by 2020.

Industrial Emissions (Framework) Regulations (Legal Notice 9 of 2013)
Industrial Emissions (Integrated Pollution Prevention and Control) Regulations (Legal Notice 10 of 2013)
Industrial Emissions (Large Combustion Plants) Regulations (Legal Notice 11 of 2013)

These three legal notices are among the six legal notices through which the IED is transposed into Maltese Law. The operations of the CCGT and LNG plants can only go ahead

after a permit issued under these regulations. The reader is referred to the discussion in Section 2.1 (on page 7).

7.1.2 Resources

Malta Resources Authority Act (Chapter 423 of the Laws of Malta)

This act provides for the setting up of the *Malta Resources Authority* (MRA), which has regulatory responsibilities with respect to energy, water, and mineral resources.

Water Policy Framework Regulations (Legal Notice 194 of 2004)

This legal notice provides the framework for the protection of coastal waters and inland water bodies. It transposes into Maltese Law the *Water Framework Directive* (WFD) (*Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy*).

7.1.3 Health and safety

Occupational Health and Safety Authority Act (Chapter 424 of the Laws of Malta)

This act provides for the setting up of the *Occupational Health and Safety Authority* (OHSA) and for the framework for the formulation and implementation of regulations and measures connected with the safeguarding health and safety of workers in work places and of third parties.

Control of Major Accident Hazard Regulations (Legal Notice 37 of 2003)

This legal notice provide the basis for the prevention and control of accidents in plants where dangerous substances are stored and/or used. These regulations transpose into Maltese Law the requirements of the Seveso II Directive (*Council Directive 96/82/EC on the control of major-accident hazards*).The Seveso III Directive (*Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC Text with EEA relevance*) will be replacing the Seveso II in 2015. The SevesoIII, will among other things, provide to the public better access to information, and more stringent inspections and enforcement standards.

Workplace (Minimum Requirements for Work) (Confined Spaces and Spaces Having Explosive Atmospheres) Regulations (Legal Notice 41 of 2004)

These regulations establish the requirements for the protection of workers in confined spaces or in spaces having explosive atmospheres. They transpose into Maltese Law the ATEX 137 Directive (*Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres*).

Product Safety Act (Chapter 427 of the Laws of Malta)

This act, among other things, provides the framework for the issue of regulations concerned with product safety.

Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations (Legal Notice 372 of 2002)

These regulations are applicable to equipment and protective systems for use in potentially explosive atmospheres. The ATEX 95 Directive (*Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres*) is transposed into Maltese Law through this legal notice.

7.1.4 Energy

Electricity Generation Plan

This plan was published in 2006 by Enemalta Corporation and MIT&I. This plan presented the above issues and also stressed the need for the procurement of newgeneration plant in order to meet the forecasted demand as well as to replace the output of Marsa Power Station.

7.2 Standards commonly applied to LNG projects

The following is a selection of technical standards, codes, and guidelines, which are concerned with the design, installation, and operation of LNG facilities:

ABS .....Guide for building and classing: Floating offshore liquefied gas terminals

API RP 14C .....Recommended practice for analysis, design, installation, and testing of basic surface safety systems for offshore production platforms

API RP 520 .....Recommended practice to standardize the pre-selection of safety valves for gases, vapors, liquids and two-phase flow service

API 521 .....Guide for pressure relieving and depressuring system

BS EN 1160:1997.....Installations and equipment for liquefied natural gas. General characteristics of liquefied natural gas

BS EN 12434:2000.....Cryogenic vessels. Cryogenic hoses

BS EN14620-1:2006 .....Design and manufacture of site built, vertical, cylindrical, flat-bottomed steel tanks for the storage of refrigerated, liquefied gases with operating temperatures between 0°C and -165°C. General

BS EN 1473.....Installation and equipment for liquefied natural gas. Design of onshore installations

BS EN 1474:2008.....Installation and equipment for liquefied natural gas.Design and testing of marine transfer systems. (Standard issued in three parts)

DNV.....Floating liquefied gas terminals. Offshore technical guidance OTG-02

IGC-Code .....International code for the construction and equipment of ships carrying liquefied gases in bulk

ISO 28460:2010 .....Petroleum and natural gas industries -- Installation and equipment for liquefied natural gas -- Ship-to-shore interface and port operations

NFPA 59A .....Standard for the production, storage, and handling of liquefied natural gas (LNG)

7.3 MARPOL Convention

There are many organisations which deal with shipping in different ways. The most relevant is the *International Maritime Organization* (IMO), which forms part of the United Nations, which is responsible for safety and security of shipping and developing international regulations.

The IMO*International Convention for the Prevention of Pollution from Ships* (MARPOL)is the main international convention to prevent pollution by ships, includes regulations for concerning the following:

- Prevention of pollution by oil (Annex I).
- Control of pollution by noxious liquid substances in bulk (Annex II).
- Prevention of pollution by harmful substances carried by sea in packaged form (Annex III).
- Prevention of pollution by sewage from ships (Annex IV).
- Prevention of pollution by garbage from ships (Annex V).
- Prevention of air pollution from ships (Annex VI).

Annex VI requirements were incorporated in EU policy through *Directive 2005/33/EC of the European Parliament and of the Council of 6 July 2005 amending Directive 1999/32/EC as regards the sulphur content of marine fuels*[10](subsequently amended by *Directive 2009/123/EC of the European Parliament and of the Council of 21 October 2009 amending Directive 2005/35/EC on ship-source pollution and on the introduction of penalties for infringements*).The parts of Directive 1999/32/EC were subsequently re-modified through *Directive 2012/33/EU of the European Parliament and of the Council of 21 November 2012 amending Directive 1999/32/EC as regards the sulphur content of marine fuels*, the provisions of which will come into force in Member States in mid-2014. These modifications will bring EU environmental policy in line with developments in MARPOL Annex VI.

Besides the new IMO regulations on sulphur emissions there are other drivers that are induced to reduce the environmental footprint of the shipping industry. The *European Maritime Safety Agency* (EMSA), for example,has worked closely with the European Commission on the issue of *Commission Decision of 13 December 2010 on the establishment of criteria for the use by liquefied natural gas carriers of technological methods as an alternative to using low sulphur marine fuels meeting the requirements of Article 4b of Council Directive 1999/32/EC relating to a reduction in the sulphur content of certain liquid fuels as amended by Directive 2005/33/EC of the European Parliament and of the Council on the sulphur content of marine fuels*. Under this decision LNG carriers would be allowed to burn boil-off gas when berthing.

Notes

10 Council Directive 1999/32/EC of 26 April 1999 is concerned with the "reduction in the sulphur content of certain fuels".

8 CONCLUSION

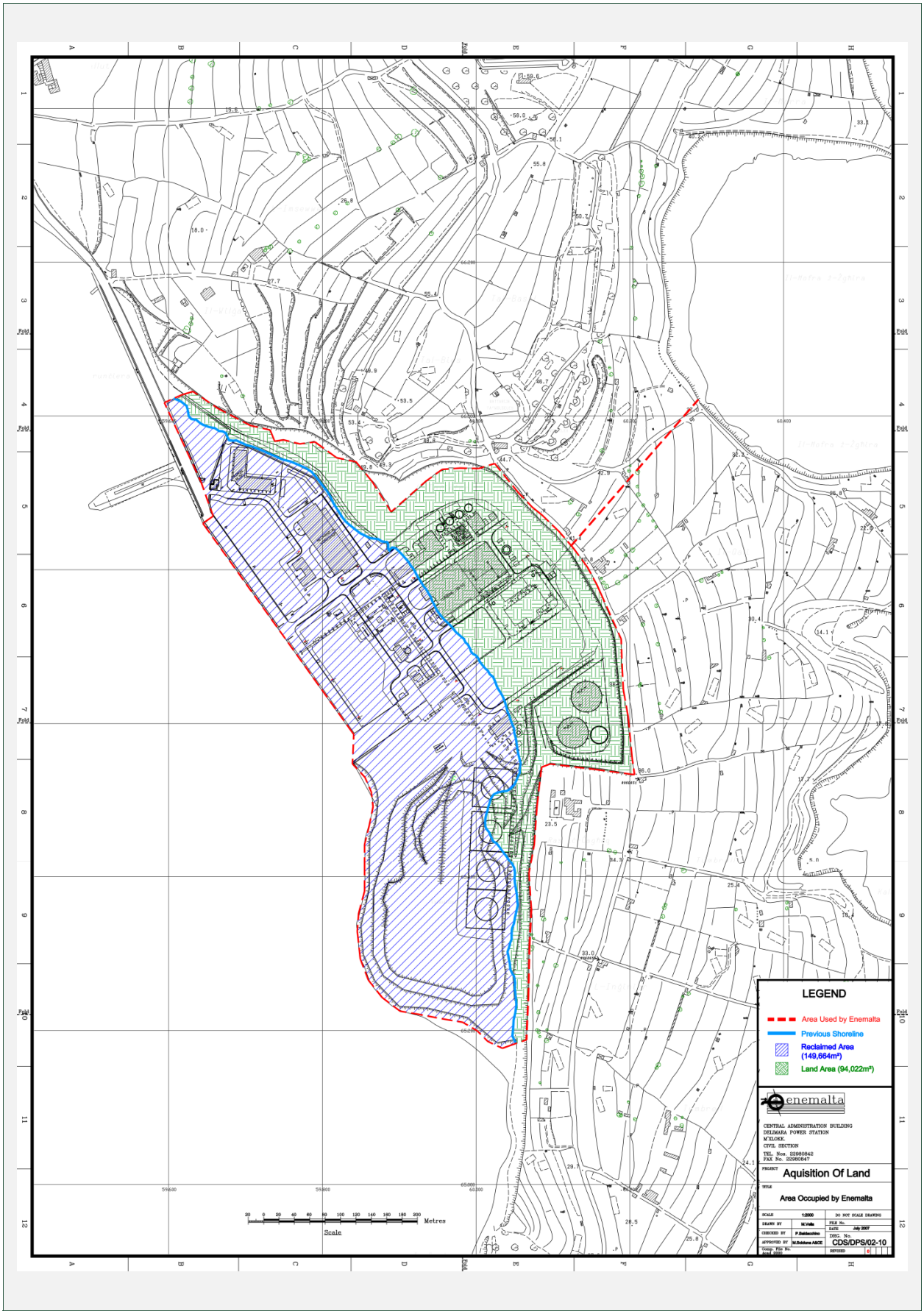
Without the new CCGT Plant there is an increasing risk ofelectricity supply interruptions, with disturbing consequences forlocal tourism, industrial output, the economy in general, the standard of living ofthe Maltese and Malta's reputation among foreigners and investors.

Steady growth of the economy increases demand for power and Enemalta is committed to provide it within its mission statement: To meet the energy needs and expectations of thecustomer in a safe, efficient, and profitable manner whilst safeguarding theenvironment.

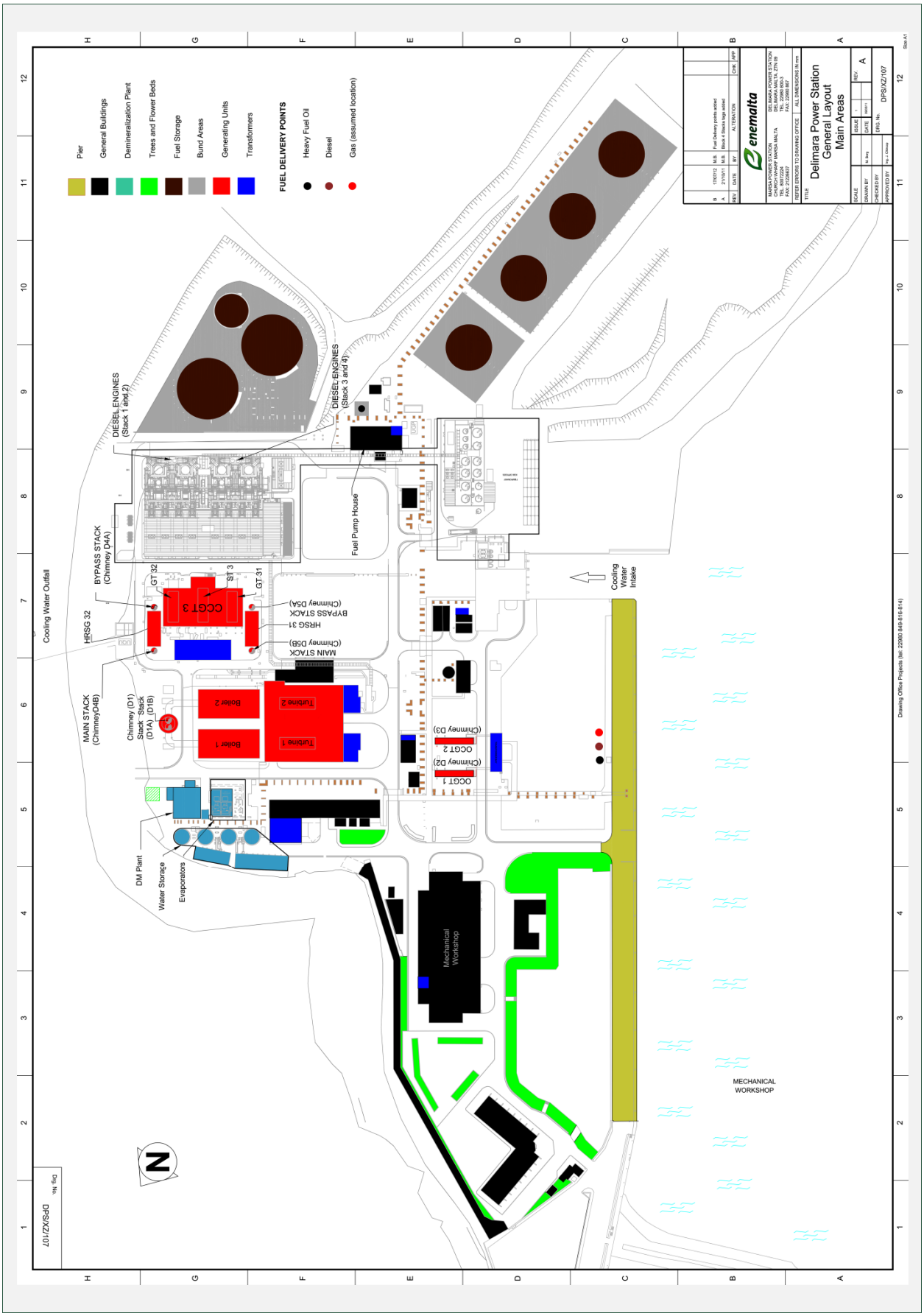
The considerations described in this Statement lead to proposal for the new CCGT Plant and the new LNG Plant as described herein and for both to be located within the existing Delimara Power Station site.

APPENDICES

Appendix A: Delimara Power Station Site



Appendix B: Delimara Power Station General Layout



Appendix C: Areas of Buildings and General Layout