MYTILINEOS S.A

Environmental & Social Impact Assessment for Agios Nikolaos CCGT II: 826MW Combined-Cycle Gas Turbine Power Plant

Non-Technical Summary

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Contact Details:

Athens (Head) Office
8 Artemidos Street
Maroussi, 15125
Greece

Agios Nikolaos (Project) Office
Agios Nikolaos IPP2 CCGT
Agios Nikolaos Industrial Centre
Boeotia,32003, Greece

CONTENTS

1.0 - INTRODUCTION

MYTILINEOS S.A are currently developing a new 826MW(e) Combined-Cycle Gas Turbine (CCGT) within the existing MYTILINEOS Industrial Complex, Boeotia, Greece.

Figure 1: Project Location

Notes: The site is located in the Municipality of Distomo – Arachova – Antikyra; bordering the Municipality of Levadeia, in Boeotia Region, Greece. The Project will require an area of 12.14 hectares (c.30 acres); located within the wider 2,853 hectares (7,050 acres) of the Agios Nikolaos Complex.

The Project will be constructed and operated by METKA, the Sustainable Engineering Solutions Business Unit of MYTILINEOS S.A. MYTILINEOS, a globally recognized contractor in the field of thermal power plants and infrastructure projects. Notably, METKA also developed the existing thermal power facilities within the MYTILINEOS Industrial Complex. It will be operated by Protergia, the Power & Gas Business Unit of MYTILINEOS S.A., already operating the existing thermal power facilities within the MYTILINEOS Industrial Complex

The CCGT – *Agios Nikolaos II* – is being constructed within and existing Industrial Complex, adjacent to existing facilities as summarized under Table 1, overleaf, and illustrated under Figure 2.

Table 1. Summary of Installed Capacity / Facilities at Agios Nikolaos Industrial Complex, including Project

Description	Total Energy Production / Capacity	Date of Operation
MYTILINEOS Alumina-Aluminium Industrial Plant, which includes a range of support facilities and general activities, such as: anode industrial production complex; port facilities; industrial wastewater treatment plants; urban wastewater treatment plants; and, solid waste disposal facilities.	N/A	1960s
Sithya Co-generation Plant (CHP), which was constructed by METKA, and utilises CCGT technology with a '2 Gas Turbine + 2 HRSG + 1 Steam Turbine' configuration. The co-generation plant includes dual-fuel back-up auxiliary boilers to ensure continuous steam production to the neighboring alumina refinery.	778MW (including net 334MW(e))	January 2013
Agios Nikolaos IPP (CCGT-I), also constructed by METKA, and utilizes CCGT technology with a '1 Gas Turbine + 1 HRSG + 1 Steam Turbine' configuration. As part of this project, a new 400kV GIS (Gas Insulated) Substation was installed.	444.48MW(e)	June 2011
The Project: **'Agios Nikolaos II' CCGT**, based on a '1 Gas Turbine + 1 HRSG + 1 Steam Turbine' configuration. The project will utilize General Electrics 'H Class' Gas Turbine technology, enabling the plant to operate at a thermal efficiency >63%; rendering the plant one of the most efficient in Europe.	826MW(e)	Q1 2022 (Proposed)

The Project has received all relevant permits from the Greek Competent Authorizes and EIA has been undertaken in line with the EU EIA Directive and Greek requirements; including National Law No. 4014/2011, and Ministerial Decree No. 1915/2018, which relate to National transposition of EU EIA requirements.

The Project construction started in February 2020, with Commercial Operation Date (COD) scheduled for May 2022. The permits are available here: CCGT 1st permit, CCGT 826MV, CCGT construction, HVL 400kV (rerouting), HVL 400kV (new line).

This Non-Technical Summary (NTS) provides a description of the project and describes the potential benefits and impacts associated with its construction and operation. It also describes how these will be mitigated and managed through all phases of the project. In addition, it provides a summary of the public consultation activities and the approach to future stakeholder engagement.

The NTS has been prepared for potential Corporate Finance to MYTILINEOS, by the European Bank for Reconstruction and Development (EBRD); the proceeds of which will contribute towards the development cost of the Project. The European Investment Bank will also be co-financing, with MYTILINEOS also providing equity to cover the development costs.

In addition, this NTS provides supplementary information, to compliment the Environmental Impact Assessments already undertaken.

The EIA for the CCGT is available in **English**[1] and **Greek**[2].

The EIA for the OHTLs (400kV Rerouting and New OHTL) is also available in **English**[3] and **Greek**[2].

[1] <Insert Link to EIA – English Copies>

[2] Greek copies of the EIAs – for the CCGT, as well as the OHTLs, are available at Electronic Environmental Register. This register is used to publish all EIAs and responses from relevant authorities, including environmental permitting bodies, and the general public, including NGOs. The register can be accessed here: https://eprm.ypen.gr/

[3] <Insert Link to OHTL EIAs – Amended OHTL and New OHTL – English Copies>

Figure 2: Site Layout

Notes: The Project is part of the industrial facility of Aluminium of Greece S.A., owned by MYTILINEOS The industrial facility comprises: ***MYTILINEOS Alumina-Aluminum Plant***, which has been operating since the 1960s; ***Sithya Co-generation (CHP) plant***, which has been operating since 2013; and, ***Agios Nikolaos IPP 444.48MW CCGT***, which has been operating since June 2011.

2.0 - WHY IS THE PROJECT REQUIRED?

The Project is of particular importance in light of the Greek government announcement at the UN Climate Summit (September 2019), to close all lignite-fired power plants by 2028. In this context, the development of additional – significantly cleaner – thermal capacity is required to enable the plant closure, whilst retaining security and flexibility of power supply.

The use of modern, ***high-efficiency gas turbine technology*** allows per generation at a ***significantly lower carbon intensity***; and furthermore, opportunities for future modification to either ***Carbon-Capture-Storage*** (CCS), of ***Hydrogen*** (H_2) blending. These are discussed separately herein, under Sections 4.3 and 4.4, respectively.

The Project has been assessed against the Greek National Plan for Energy and Climate, which covers the duration up to 2030, and has been determined through the National EIA approval process to be "fully compatible" with the objectives and principles of the Greek National Plan.

2.1 EU Taxonomy Alignment

The EU Taxonomy is a classification system which establishes a list of '*environmentally sustainable economic activities*. The classification of these economic activities is aligned with the European Union's target of achieving a climate neutral economy (also referred to as 'net zero') by 2050.

The EU Taxonomy is supported by the *Taxonomy Report: Technical Annex* (March 2020), which has been produced by the EU Technical Expert Group on Sustainable Finance. The Technical Annex provides criteria to qualify an economic activity as 'environmentally sustainable'.

The Project falls under Section 4.7, *Production of Electricity from Gas* (*not exclusive to natural gas*).

In relation to climate change objectives, there are two specific thresholds:

- **Climate Mitigation Target: 100gCO_2/kWh**, which is considered to be aligned with actively achieving the EU's target to be Net Zero by 2050. This threshold decreases every 5-years, to 0gCO_2/kwH by 2050.
- **Climate Adaptation Target: 262gCO_2/kWh**, which is the regional average (as per the International Energy Agency, IEA); below which activities are not considered to be doing significant harm.

In addition to the above, the economic activity must *Do No Significant Harm* (DNSH) harm to other EU Environmental Objectives; as follows:

- The sustainable use and protection of water and marine resources;
- The transition to circular economy;
- Pollution prevention and control; and
- The protection and restoration of biodiversity and ecosystems.

Project Compliance Pathways

Although the project will have an initial carbon intensity in the order of 332CO_2/kWh; it has been designed to enable future carbon reduction via either *Carbon-Capture-Storage* (CCS); or *Hydrogen Blending*. These are discussed under Sections 4.3 and 4.4, respectively.

As part of EBRD's financing of the Project, an Environmental & Social Action Plan requirement has been included to ensure that the Project undertakes a detailed feasibility review of both options; and develops a roadmap to attain 2030 and 2050 EU targets relating to decarbonization.

In relation to DNSH to other environmental objectives; the *Technical Annex* states – in relation to Production of Electricity from Gas – that "*the key environmental aspects to be taken account when investing in this activity are the impact on local water (consumption and sewage), the fulfilment of the applicable waste and recycling criteria; the NOx and CO emissions control in line with BREF indicators; and the avoidance of direct impacts on sensitive ecosystems, species or habitats*".

The project is **aligned with DNSH requirements**; particularly given that the project will not require any additional water abstraction; does not significant impacts on sensitive ecosystems or habitats; and is aligned with BREF indicators, including NOx and CO, but also broader requirements such as Energy Efficiency (see Appendix A, *Analysis of Best Available Techniques*).

3.0 - WHAT DOES THE PROJECT INCLUDE?

The project will benefit from shared use of existing facilities, auxiliaries, and other synergies at the industrial complex. These include natural gas delivery point, which is direct from the main national operator (DESFA) station; main 400kV substation; existing harbour/pier as main access way direct to the sea; service and fire-fighting water supply; interconnection of cooling water make-up from the existing power plant cooling system.

3.1 CCGT

The Project will involve a single, high efficiency, 826MW natural gas fired Combined-Cycle Gas Turbine (CCGT) unit. The project will produce electricity only (no heat production); and only operate in combined-cycle, and the detailed design and main equipment specification are in an advance stage. The main components of the CCGT are summarized below:

- **1 no. Gas Turbine** (GT), provided by General Electric (GE). The GT (GE 0HA.02) will have an output of c.530MW; and represents GE's high-efficiency (>60% in combined-cycle) 'H Class' technology. The GT is also proved in hydrogen-firing, which provides greater flexibility and pathways to ensuring that the project is consistent with future decarbonization objectives. The GT will be fitted with a ***Heat Recovery Steam Generator*** (HRSG, manufactured by NOOTER/ERIKSEN), which will subsequently supply the Steam Turbine.
- **1 no. Steam Turbine** (ST), also provided by GE,
- The unit will include a **50m main stack**; no bypass-stack is included, and as such, open-cycle (i.e. operation of the GT only, which will result in lower efficiency overall), will not occur.

The Project will operate approximately 7,200 hours per year (baseload power generation), with an approximate output of 5,000GWh.

Figure 3: Schematic Illustration of a Combined-Cycle Gas Power Plant.

(LCP BREF, *Fig. 3.56: Schematic of a combined-cycle power plant with a heat recovery steam generator (HRSG)*, pp. 271)

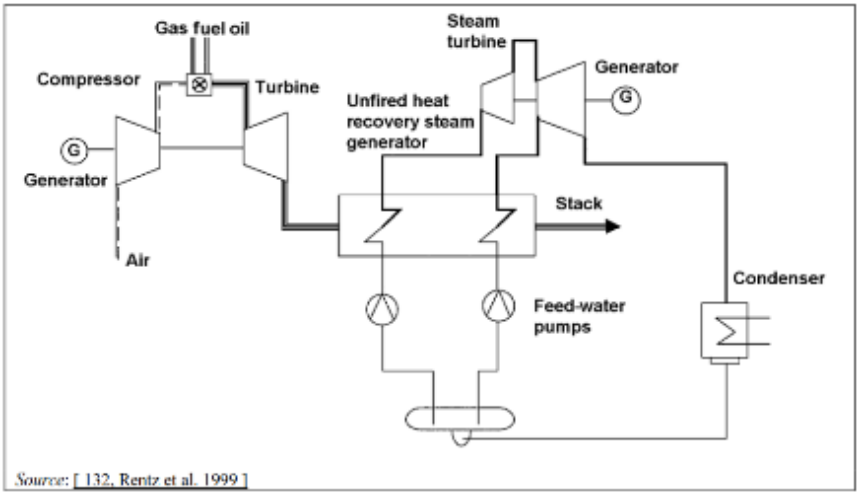


Table 2. Summary of Facilities and Shared Infrastructure

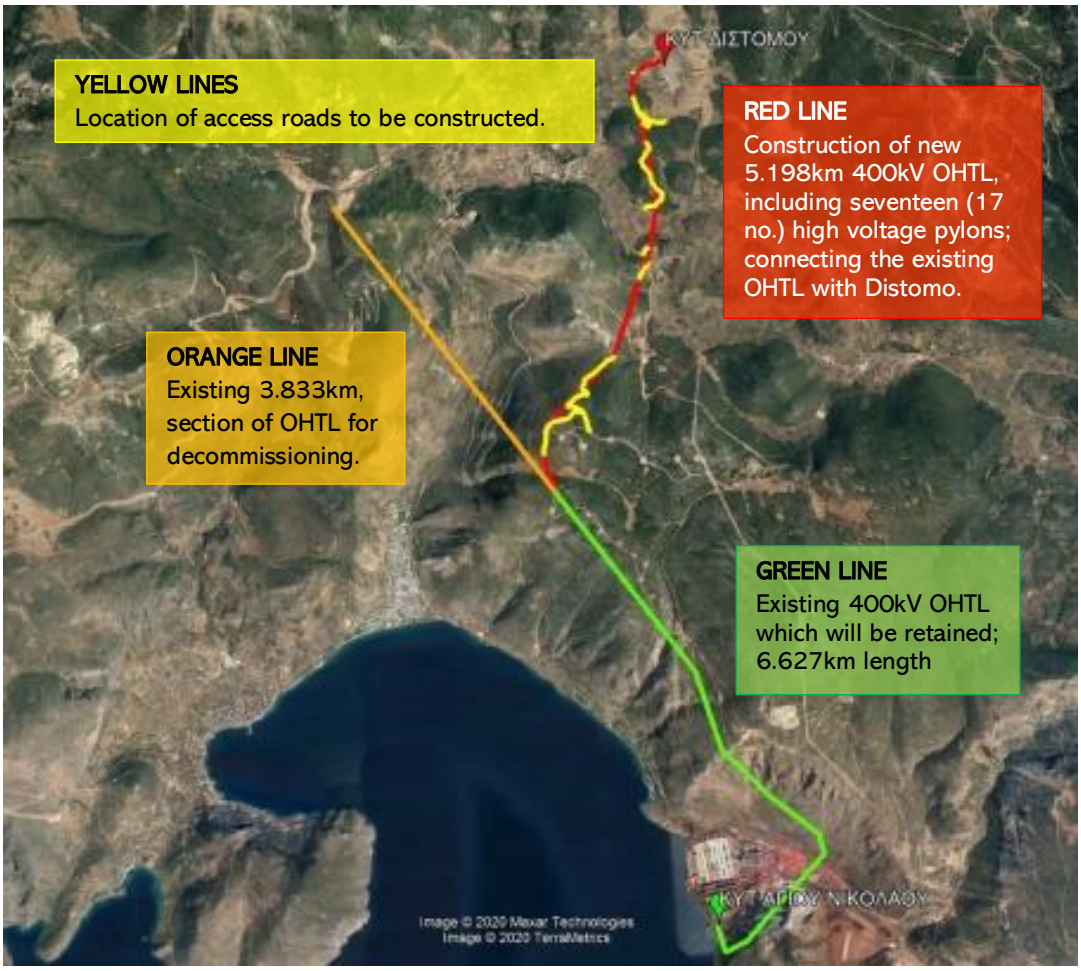
Facility	Description of Existing Facilities	New Facilities Required
Fuel Supply	Natural gas is already delivered to Agios Nikolaos Complex, and a connection agreement is in place (signed by the Greek Natural Gas Transmission Operator and Supplier, *DESFA*, 26 May 2020) for the supply of natural gas fuel to the Project.	***No additional infrastructure outside the site boundary is required.*** Relatively minor works are required within the site boundary, primarily: ▪ New direct connection (36 bar), by-passing the current metering station; and, ▪ New gas compressor station (45 bars). Annual average gas consumption is estimated at 9,000GWh (HHV).
Cooling Water Supply	Cooling water is provided from the existing Sithya CHP plant, which uses a once-through condenser. The Sihya CHP abstracts water from the sea, via: ▪ 15 no pumping wells, abstracting fresh water with a maximum annual pumped quantity of **5,632,344m³**; and, ▪ 2 no. brackish water boreholes with a maximum annual abstraction of **3,478,600m³**. Sithya CHP is licensed to abstract up to **22,000m³/h**.	**Cooling Water** The project will require up to **2,284 m³/h** for cooling purposes; all of which will be available from the Sithya CHP cooling discharge. Aside from new pumps to allow the Project to continue to operate independently of the Sithya CHP; ***no further / new facilities are required***.
Water Treatment	A demineralised Water Treatment Plant is currently installed at the industrial complex.	**Industrial and Deionized Water** The Project's annual water requirement will be **107,748m³**. All demineralized water and service water requirements will be met by existing facilities. ***The project does not require any further / new facilities are required.***
Sewage Treatment	A shared wastewater treatment plant is operational at the site, which includes capacity to treat the Project's industrial wastewater. Discharge is monitored (pH, Total Suspended Solids (TSS), temperature, and heavy metals). A shared biological treatment plant is also available for sanitary waste.	Wastewater produced by the project will be treated at the existing wastewater treatment plant, which is a shared facility on the industrial complex. The additional discharge resulting from the Project will not exceed the overall discharge volumes permitted under the current license Sanitary waste will be treated at the existing biological treatment plant. ***The project does not require any further / new facilities are required.***

3.2 Overhead Transmission Lines (OHTLs)

The Project involves the modification of an existing OHTL; along with the construction of a new OHTL. The OHTLs have been permitted; a brief summary of both OHTLs are provided below. Both lines are also shown under the Figure 5, overleaf.

- **Modifications to existing 400kV OHTL**, which will involve:
  - decommissioning 3.833km of the existing OHTL;
  - construction of a new 5.198km OHTL, including erection of seventeen (17 no.) high voltage pylons; to connect the remaining OHTL with Distomo High Voltage Centre.
  - In combination, the re-aligned OHTL will be 11.825km in length, including thirty-seven (37 no.) high voltage pylons.

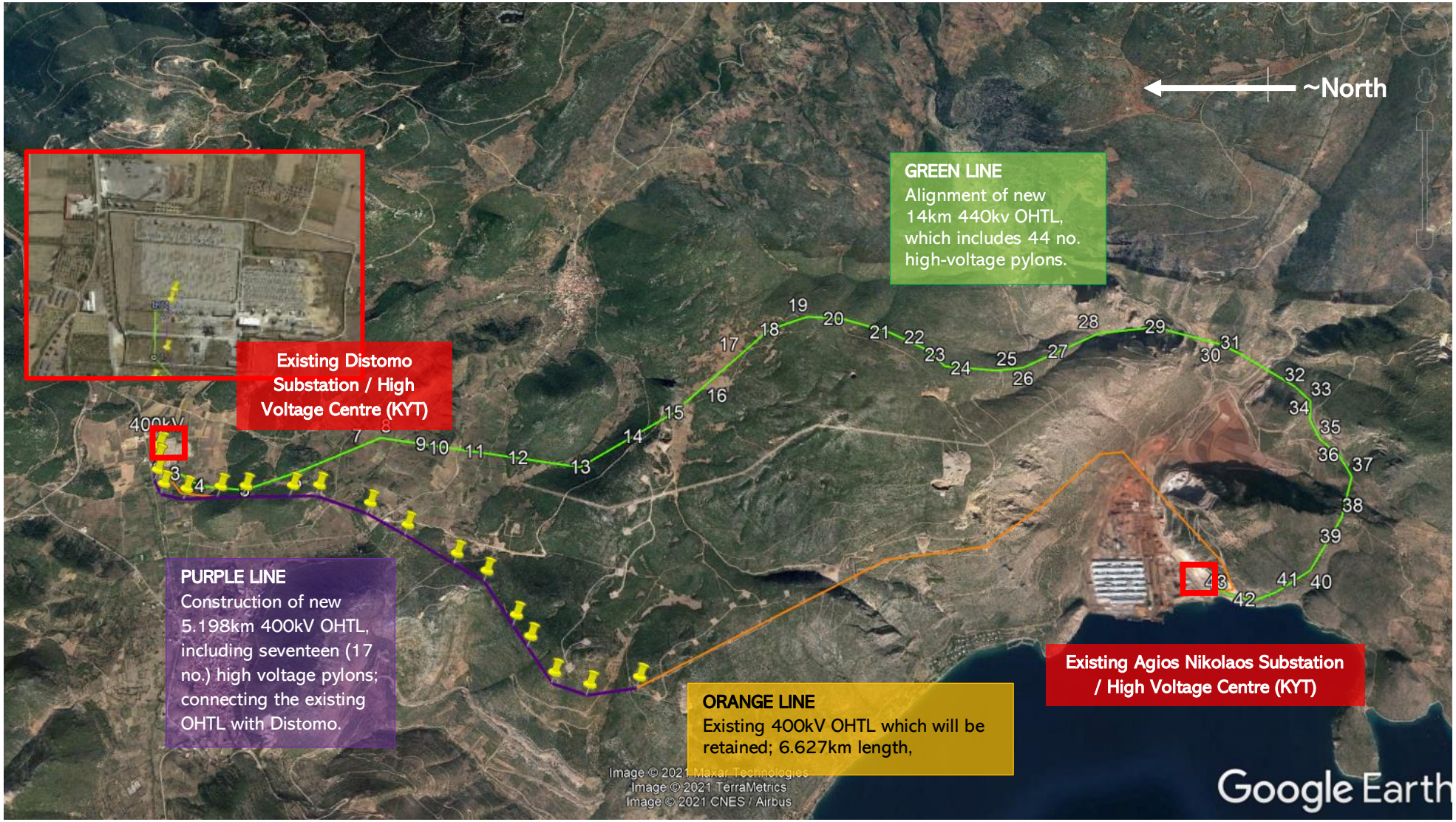
Figure 4: Overview of Amended OHTL, including Decommissioned and Newly Constructed Sections



- **New OHTL, Agios Nikolaos High Voltage Centre (KYT) – Distomo High Voltage Centre (KYT),** The new line is 14km in length, with a total of forty-four (44 no.) high voltage pylons. Approximately 8,700m of forest roads will be developed/cleared, in order to enable construction and maintenance.

Other than the installation of new 400kV Gas Insulated Switchgear at Agios Nikolaos, and new 400kV Air Insulated Switchgear at Distomo; neither substations will require expansion beyond the current boundaries.

Figure 5: Overview of Existing; Amended; and New OHTLs



3.3 'No Project'

The Project will play a key role in the energy transition in Greece, allowing the decommissioning of older technology; particularly lignite-fired power plants. To enable this transition to occur, new generation capacity is required. In the event that this project did not proceed, there would be a potential delay to the necessary transition and decarbonization of the grid. The ability to develop high-efficiency plant within the existing industrial complex offers a number if significant benefits: reduction in the required ancillary infrastructure; minimization of new high voltage transmission routes and fuel supply routes; and the utilization of existing industrial land.

In summary, the 'No Project' scenario is not considered compatible with the necessary baseload capacity to enable Greece to decommission older, more polluting power production facilities.

3.4 Alternatives Analysis

As part of the Environmental Impact Assessment of the CCGT, an Alternative Analysis was undertaken (Chapter 7), including the following key design parameters: type of fuel; and cooling technology. It is also noted that the original concept for the Project was 775MW capacity; however, a review of alternatives and newer available technology, allowed the capacity to increase to 826MW, with a significant increase in efficiency from 60.8% to 63.1%.

Fuel Options

The Project will operate using natural gas only; and as such, is a significantly cleaner fuel as compared to fuel oil. Furthermore, the specific GTs selected for the project are capable of burning natural gas blended with hydrogen – this is discussed further under Section 4.4; and offers the possibility of further reducing the carbon intensity and air pollutants generated from the project.

Cooling Methods: Ongoing Detailed Alternative Analysis

Cooling methods is a particularly key aspect of the alternative analysis. The Project has adopted ***Mechanical Draft Wet Cooling Towers***, which is fed by seawater, which is discharged by the adjacent Sithya CHP Plant. Mechanical Draft Wet Cooling Towers are a common cooling solution for high-efficient CCGT. Whilst the cooling system will operate on a 'closed-loop' basis, a continuous supply of 'make-up' water is required to replace losses. These losses arise from: (a) evaporation of water in the cooling towers; and (b) a continuous discharge ('blowdown') of the circuit water in order to manage the coolant chemistry and properties. A summary cooling water balance, including the expected water losses), is provided below:

Table 3. Summary of Cooling Water Demand & Water Losses

Available Water from Sithya CHP Cooling Discharge (m^3/h)	Project Cooling Water Requirement (m3/h)	
Upto 22,200	**Total = 2,284**	
	Evaporative Losses = 534 *(23%)*	*Blowdown = 1,750 (Max.)* *(77%)*

Whilst Mechanical Draft Wet Cooling Towers offer a relatively compact solution, which does not significantly impact overall plant efficiency; it does result in water losses of up to 50%. However, at present, this water is discharged to the sea direct from Sithya CHP; and the implementation of this project will result in a net reduction of the thermal discharge being released into the sea. In this context, there is a significant benefit to counterbalance the impact of water losses. Furthermore, such water losses are more commonly a significant risk where the source water body is isolated and at risk of depletion (as oppose to abstractions from the sea).

Notwithstanding the above, alternate cooling techniques were considered, including Air-cooled Condensers (ACCs) and Once-through Cooling (OTC).

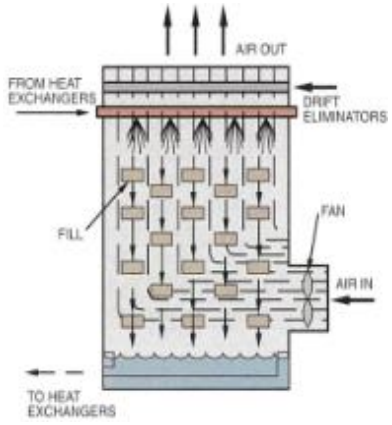
Table 4. Qualitative Cooling Technology Options Appraisal

Technique	Abstraction Demand	Water Losses (Evaporation & Blowdown)	Efficiency	Comments
Air Cooled Condenser (ACC)	**LOWEST**	**LOWEST**	**LOWEST**	Results in efficiency impacts, and consequentially, greater fuel consumption and increased carbon intensity (gCO2(e)\kWh). Air-cooling demands space because of the low specific heat capacity of air. Air-cooling systems have limits to their location as they cannot be placed too close to buildings because of the resulting air-circulation, blockage of air-supply and the danger of recirculation; Given the built-up nature of the power plant and surrounding area this limits the viability of a large air-cooled system. Large air-cooled systems can also give rise to problems of noise nuisance.
Mechanical Draft Wet Cooling Towers **(Proposed Technique)**	**COMPROMISE**	**COMPROMISE**	**COMPROMISE**	Whilst it uses more water than ACC this is minimised through the recycling of the sew-water with top-up for evaporation losses only. There is also a site-specific benefit, taking into account the available space within the Industrial Complex, and ability to utilise the existing Sithya CHP cooling discharge (and in turn, offer a net reduction in thermal discharge into the sea).
Once-through Cooling (OTC)	**MOST**	**COMPROMISE**	**HIGHEST**	Control of the temperature of the process is easier with air-cooling or with a recirculating flow than with once-through cooling, where the balance of water inlet and outlet restricts the controllability of the water flow and the temperature increase. ***Largest extraction demand and return of water which would have a larger heat penalty and biocides which are likely to be halogen based***.

Examples of ACC, Mechanical (Forced) Draft Cooling Towers, and OTC

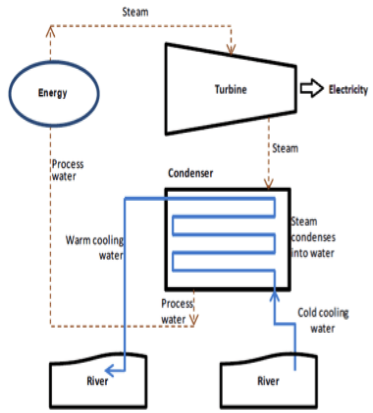
Air Cooled Condensers: example of an air-cooled condenser of turbine exhaust steam.

(Reproduced from IPPC, Reference Document on the Application of Best Available Techniques to Industrial Cooling Systems, December 2001.)



Forced Draft Cooling Tower: Schematic representation of a forced draft tower with counter flow design

(Reproduced from IPPC, Reference Document on the Application of Best Available Techniques to Industrial Cooling Systems, December 2001.)



Once-through Cooling: Schematic of a once-through cooling system abstracting cool water, and discharging warm water, into a river (such as the KMK).

On consideration of the various advantages and disadvantages of each cooling technique; the proposed Mechanical Draft Wet Cooling Towers is considered to provide a reasonable compromise across water demand and overall efficiency impacts. Furthermore, there is limited development space available within the industrial complex; and the integration with the existing Sithya CHP cooling system offers further site-specific benefits.

3.5 Project Status

The project is currently under construction, with groundworks of the CCGT commenced on 19 February 2020. An indicative Project Implementation timeline is provided below:

Table 5. Summary of Key Project Milestones

Project Milestone	CCGT	Amended OHTL	New OHTL
Notice to Proceed (NTP)	27 September 2019	-	-
Approval of EIA		28 January 2021	12 July 2021
Commencement of Construction	19 February 2020	October 2021	December 2021
Gas Turbine 1st Fire	30 December 2021	-	-
Commercial Operation Date (COD)	**31 May 2022**	**-**	**-**

WHAT HAS CHANGED SINCE THE ORIGINAL ENVIRONMENTAL IMPACT ASSESSMENT?

Three (3 no.) Environmental Impact Assessments (EIAs) have been prepared for the Project, covering the main project components:

- **CCGT EIA**; an original EIA was prepared in February 2019; and followed by an Amended EIA (dated October 2019) when the nominal power of the Project was increased from 775MW to 826MW. The Amended EIA was submitted to the Department of Environment and Energy; and approved on 09 December 2019.

  EIA for Amended OHTL was submitted for approval in October 2020 and was approved on 28 January 2021 Approval of tis EIA: [link].

- **EIA for New OHTL** was submitted in December 2020 and has been approved on 12 July 2021. Approval of this EIA: [link].

Whilst there have been no significant additional studies since these EIAs, this section provides some further commentary and discussion on key project aspects, in light of current technology and viability analysis. These are discussed in turn, and comprise:

- Best Available Techniques (BAT);
- Carbon Intensity;
- Carbon-Capture Storage;
- Hydrogen (H_2) Firing; and
- Ambient Air Quality Impacts.

In addition, further assessments will be undertaken as part of the agreed Environmental and Social Action Plan (ESAP) for the project, which has been fully updated alongside this project Non-Technical Summary (NTS).

4.1 Analysis of Best Available Techniques (BAT)

BAT is a concept which requires that available techniques – i.e. technology and operational practices – are adopted to prevent, or minimise emissions or impacts on the environment. The European Commission produces *Best Available Technique Reference Documents* – or BREF Notes – which contain BAT conclusions for specific industries and define emission limits – referred to as 'BAT AELs' (BAT Associated Emission Levels).

New BAT conclusions for Large Combustion Plants (LCPs) – of which the Project falls under - were published in August 2017[4] and the accompanying revised BREF document was published in December 2017[5].

A supplementary review of the Project against the recent BREF document has been undertaken and is provided under the Appendix (Appendix A). In summary:

- **NOx AELs** (Daily 40mg/Nm^3; Annual 30mg/Nm^3) will be achieved;
- **CO AELs** (Annual 30mg/Nm^3) will be achieved;
- **Net Electrical Efficiency** (54 – 60.5%) will be achieved, with the plant delivering 63.1%.

4.2 Carbon Intensity

An updated carbon emission estimate has been undertaken, with reference to the latest planned operations and financial models. A summary of the Project's carbon emissions, and carbon intensity, over the period 2022 – 2041, is provided overleaf.

In summary, across the period 2022 – 2041, the average project carbon intensity is **332.30gCO_2/kWh**. This is significantly below the Greek Carbon Intensity[6] of 611gCO_2/kWh; and therefore, represents a significant contribution to the Country's decarbonization efforts.

4.3 Carbon-Capture-Storage (CCS)

The Directive on the geological storage of carbon dioxide (Directive 2009/31/EC) (the Carbon Capture and Storage (CCS) Directive) in the Official Journal of the European Union, came into force on 25 June 2009.

The CCS Directive requires operators of all combustion plants with an electrical capacity of 300 megawatts (MW) or more (and for which the construction / operating licence was granted after date of the CCS Directive) to have assessed whether the following conditions are met:

- Suitable storage sites for carbon dioxide (CO_2) are available;
- Transport facilities to transport captured CO_2 to the storage sites are technically and economically feasible; and;
- It is technically and economically feasible to retrofit for the capture of CO_2.

Table 6. Summary of Project Carbon Emissions and Intensity

Year	Annual Net Power Output (GWh)	Annual Operating Hours (hours)	CO_2 Emissions (tons)	Carbon Intensity (Net) (gCO_2/kWh)
2022	2,433	4,317	799909	329

[4] Conclusions on Best Available Techniques (BATs) for Large Combustion Plants (LCPs), Commission Implementing Decision (EU) 2017/1442, 31 July 2017.

[5] Joint Research Centre (JRC) Science for Policy Report, *Best Available Techniques (BAT) Reference Document for Large Combustion Plants*, EUR 28836 EN, December 2017.

[6] Greece Carbon Intensity obtained from European Investment Bank (EIB), *EIB Project Carbon Footprint Methodologies: Methodologies for the Assessmen fo Project GHG Emissions and Emission Variations* (July 2020). Value is from Table A1.3, *Country Specific Electricity Emission Factors,* and is the 'Combined Margin Intermittent Electricity Generation.

2023	4,153	7,503	1371573	330
2024	4,336	8,076	1432690	330
2025	4,060	7,364	1339778	330
2026	4,366	7,994	1442894	331
2027	4,248	7,768	1405276	331
2028	3,722	6,898	1234962	332
2029	4,134	7,685	1370921	332
2030	4,064	7,578	1347707	332
2031	3,973	7,427	1319092	332
2032	3,884	7,279	1291085	332
2033	3,798	7,134	1263673	333
2034	3,713	6,992	1236843	333
2035	3,630	6,853	1210582	333
2036	3,549	6,716	1184879	334
2037	3,470	6,582	1159722	334
2038	3,392	6,451	1135099	335
2039	3,317	6,322	1110998	335
2040	3,243	6,196	1087414	335
2041	3,243	6,196	1087414	335
		Total (2022 – 2041)	**24,832,511**	-
		Average Carbon Intensity 2022 – 2041 (gCO_2/kWh)	**332.30**	

A *CCS Readiness Review* is provided under Appendix B. As part of EBRD financing of the project, this review will be required to be updated on an ongoing basis, in order to track the viability of CCS retrofit as new technology becomes available, and market conditions change (affecting the economic viability).

At present, it should be noted that were implementation to be possible, there would be a significant (c.10%) penalty on efficiency; affecting both the economics of the plant, resource efficiency, and compliance with the current BAT Net Electrical Efficiency Target (the lower threshold is 54%, and the current Project is 63.1%). It should also be noted that current technology is capable of a 90% CO_2 capture rate; and as such, 10% CO_2 would continue to be emitted.

4.4 Hydrogen (H_2) Firing

The proposed GT (GE 9HA.01) is capable of operating on hydrogen-blended natural gas. A summary of indicative blends, together with the necessary upgrades and indicative carbon intensity reductions, is provided overleaf:

Table 7. Indicative Hydrogen Fuel Operation for GT (GE 9HA.01)

Hydrogen (H_2) Fuel Content (% vol.)	Indicative Modifications & Project Adaptations	Need for SCR[1]?	Indicative Carbon Intensity[2] (gCO_2/kWh, gross)
0%	No modifications to proposed project.	No	**308.65**
≤7%	Up to 7% H_2 can be fired with no change to the emission profile.	No	**301.70** (Based on 7% vol. H_2)
>7% - <50%	The 9HA.02 is equipped with combustors able to burn up to 50%, as results of experimental tests. Verification and the possible adaptation of plant safety system and Balance of Plant, such as fuel accessories (piping, valve, etc.), fuel skid, GT controls, GT enclosure explosion atmospheres proofing, fire protection, ventilation system, etc.	Potential need of SCR approaching 50% fuel blend	**262** (Based on 37% vol. H_2)
A Carbon Intensity threshold of **262gCO_2/kWh** is provided under EU Taxonomy, to demonstrate substantial contribution to climate change adaptation. A carbon intensity of 262 (the EU regional average, as per the IEA), is interpreted under the EU Taxonomy as the threshold for 'Do no Significant Harm'. Therefore, while activities below this 262 threshold are not considered to be providing a substantial contribution, they are also not considered to be doing significant harm.			
>50%	Necessity of replacement of the entire GT combustion system. Verification and the possible adaptation of plant safety system and Balance of Plant, such as fuel accessories (piping, valve, etc.), fuel skid, GT controls, GT enclosure explosion atmospheres proofing, fire protection, ventilation system, etc.	Yes	**236.31** (Based on 50% vol. H_2) **100** (Based on 87% vol. H_2)
A Carbon Intensity threshold of **100gCO_2/kWh** provided under EU Taxonomy to demonstrate substantial contribution to climate change mitigation. The threshold is declining, and facilities will need to be operating at a life cycle emission rate lower than 100, declining to 0 by 2050.			
100%	100% hydrogen firing appears a feasible option, by replacement of the current burners, although the entire GT combustion system would need to be upgraded at significant cost and include safety and balance of plant equipment in addition to combustor changes.	Yes	**0** (Based on 100% vol. H_2)

1 Selective Catalytic Reduction (SCR); is a 'secondary abatement' technique to reduce NOx emissions. Increased NOx emissions can occur as a result of increased firing temperatures associated with hydrogen combustion.

2 Indicative Carbon Intensity has been estimated by means of Thermoflow model of MYTILINEOS CCGT, under the following assumptions:

- ISO ambient condition;
- Full load scenario; and
- Natural gas reference composition: H_2 = 0% vol.;

Due to the potential need for SCR at H_2 fuel blends of 50%+; one potential pathway to decarbonization could involve:

- Increased fuel mixing up to an initial 37% H_2, in order to meet the 'Do No Significant Harm' threshold under the EU Taxonomy (262gCO2/kWh); then,
- Convert to 100% H_2, at which point NOx abatement (SCR) will not be required; however, other CAPEX would be required to upgrade plant components to operate safely.

4.5 Ambient Air Quality Impacts

The long term (operational) impacts of the Project have been assessed using numerical modelling (AERMOD) and risk assessment against European (EU Directive 2008/50EC) and Greek Regulations relating to Ambient Air Quality Guidelines (whichever is most stringent).

The assessment considers the cumulative effects of the existing facilities.

The findings of the impact assessment confirm that the Project will not give rise to significant effects on NOx or NO_2 concentrations, within the existing settlements or biodiversity receptors (e.g. NATURA 2000 designated sites or *Oros Parnassos* Special Protection Area (SPA)).

The EIA indicates that the *maximum hourly concentrations* exceed the limit value in the Cumulative Impact Scenario ('Scenario 3', which considers the Project in addition to existing sources); and potentially, Scenarios which consider the existing sources and the Project separately (dependent on the assumed NO_X to NO_2 conversion). Further clarification is provided below to supplement the EIA; and provide assurance that the Project is unlikely to give rise to significant effects.

Under worst case scenario, the area of modelled exceedance of the hourly limit value (expressed as the 18th highest hourly concentration over the year) is confined to a small area to the south of the facility (one model grid point, representative of an area 100m x 100m). This is an area of elevated terrain, with no permanent habitation visible on satellite imagery, close to the access road to area of quarrying.

As assessed by the EIA, this impact is ***will not result in significant health effects*** for a number of reasons. Namely:

- It is known that AERMOD produces very high concentrations on elevated terrain but for only a very limited number of hours of the year.
- These elevated concentrations are widely acknowledged to be overestimates of actual impacts.
- The potential for exposure to high concentrations is limited by the lack of habitation and/or public roads in the area of maximum impacts.
- Modelled concentrations in areas of potential repeated exposure are well below the hourly standard.

Notwithstanding the above, the company will implement an *Air Quality Management Plan*, including ongoing ambient air quality monitoring, in line with their Corporate EHS system. The monitoring data can then be reviewed against the relevant ambient air quality standards, and the modelled impacts provided under the EIA. This is normal procedure for projects of this nature.

WHAT IS THE BENEFIT OF THE PROJECT TO THE LOCAL PEOPLE AND THE ECONOMY?

5.1 Construction Phase Employment

The Project is expected to generate positive impacts on the local economy and livelihoods in terms of employment; skills enhancement; local business opportunities through the procurement of goods and services; and the stimulation of other economic sectors by increasing income in the area.

The majority of positive local impacts will occur during the construction phase, which is expected to last c.24 months, and require an average workforce of approximately 365 people, with a peak workforce of approximately 450 people. It is expected that the workforce will predominantly comprise local workers; particularly given the existing skills locally associated with the industrial complex, Sithya CHP and Agios Nikolaos development.

In addition to the CCGT workforce; additional workers will be required for the construction of the OHTLs; however, this workforce is not yet known, and will be smaller than the CCGT workforce.

5.2 Operational Phase Employment

During the operation phase, the plant will run 24 hours a day, 7 days a week, and require a workforce of twenty-five (25 no.) staff.

Due to the long-term nature of these positions, it is anticipated that they will be filled by the nationals of Greece; and in particular, unskilled labour are likely to be recruited locally.

5.3 Indirect Employment & Economic Benefits

Indirect opportunities during the construction period are largely limited to the services and hospitality sector, such as accommodation, catering, cleaning, transport and security services. Local businesses may benefit during the construction phase as there will be increased spending within the area by the waged labour who will have relatively improved buying power.

Indirect opportunities during the operational period will be centered around maintenance activities; and providing goods and services to the Project. For those companies that meet eligibility criteria, they will be 'Approved Suppliers' and entered into the supply chain. This will provide a secure long-term business relationship and an opportunity for local business growth and development.

Notably, the Project has a policy that local suppliers will be used preferentially, and suppliers from outside the local area will only be used when a local supplier is not available.

5.4 Labor and Working Conditions

As there will be large numbers of workers required for construction – and construction works will be within an operational industrial complex - special care needs to be exercised to ensure adequate working conditions for both direct and indirect workers. The table overleaf summarizes key areas of potential concern and proposed mitigation measures, particularly in relation to the construction phase.

The project will require a relatively small workforce during operation (25 no. staff), which are anticipated to be largely filled by Greek nationals (including from local communities), given the long-term nature of the roles.

MYTILINEOS S.A. has developed the following policies relating to labor and working conditions;

- Human Rights Policy;
- Recruitment Policy; and
- Employee Code of Conduct.

As the project is constructed by METKA - the Sustainable Engineering Solutions Business Unit of MYTILINEOS, the above policies are also adopted at project-level. These policies will also be aligned with EBRD requirements relating to Child and Forced Labour; Gender Discrimination and Gender-based Violence and Harassment (GBVH).

In addition to the above, a *Workers Grievance Mechanism* will be implemented at the Project.

It is noted that in Greece, Trade Unions also play an important role in protecting employees' rights; and the MYTILINEOS Code of Conduct includes the right to freedom of association and collective bargaining.

Table 8: Labour and Working Conditions during Construction Phase: Summary of Key Risks

Aspect	Potential Concern	Proposed Mitigation Measures
Workers Accommodation	Although an onsite workers accommodation camp will not be required; the Project should ensure that appropriate accommodation in the surrounding area is used; which is substantively aligned with the IFC and EBRD Guidance Note, *Workers' Accommodation: Processes and Standards* (September 2009). In addition, Workers Accommodation should be considered in the context of the Project's *Covid-19 Risk Assessment* and associated management plans. This is to ensure that the potential for Covid-19 transmission within local communities is not exacerbated as a result of worker influx.	▪ Workers accommodation facilities to be compliant with Greek Regulations; and substantively aligned with FC and EBRD Guidance Note, *Workers' Accommodation: Processes and Standards* (September 2009). ▪ Contractors and sub-contractors will be required to carry out internal inspections on the accommodation using checklist included in Annex I of the IFC and EBRD guidance note on workers accommodation; and report their findings to the Project Company. ▪ All workers will have an easy access to the grievance mechanism, allowing for anonymous grievances. ▪ Accommodation strategy to be developed in context of Covid-19 risk assessment.
Health & Safety	The project is going to have a complex contracting chains, with multiple sub-contractors and suppliers, including significant number of indirect workers.	▪ METKA the Sustainable Engineering Solutions Business Unit of MYTILINEOS S.A. is one of the largest industrial EPC contractors globally, with a track record of managing Health & Safety risks on complex development projects. ▪ The Project adopts MYTILINEOS-level policies with regards to Human Resources and Health & Safety. In particular, this includes development of a **site-specific Health & Safety Management Plan**. MYTILINEOS S.A. operates an Occupational Health & Safety (OHS) Management System certified to 45001:2018.. ▪ A Project-level Health & Safety Management Plan has been developed, and applies to all direct employees and subcontractors, over both the construction- and operational-phases.

Human Resources	The Project will employee a construction workforce of 325 staff, comprising direct employees of the Project Company; EPC Staff and Subcontractors.
	
	The Project will ensure that the Lenders Human Resource requirements, in addition to all Greek Employment requirements, are complied with across the workforce.
		▪ Any subcontractors to METKA will also be required to adopt MYTILINEOS Policies and Procedures, which are aligned with Good International Industry Practice. These requirements will specifically include provisions relating to:
		  ▪ Working conditions and Terms of employment;
		  ▪ Informing workers about their rights and obligations;
		  ▪ Child Labour and Forced Labour;
		  ▪ Equal Opportunities/non-discrimination;
		  ▪ Workers organisations;
		  ▪ Occupational Health and Safety
		  ▪ All workers will have an easy access to the grievance mechanism, allowing for anonymous grievances

POTENTIAL ADVERSE SOCIO-ECONOMIC IMPACTS OF THE PROJECT

6.1 Land Acquisition, Involuntary Resettlement, and Land Lease

CCGT Development Footprint

The CCGT is being developed within the existing industrial complex, on an area of approximately 12 hectares. As such the CCGT project will not require any further land acquisition.

OHTL Routes

The majority of the OHTL routes (see Figure 5, *Overview of Existing; Amended; and New OHTLs*), will be constructed within state owned land.

However, there are some small areas of private land which will require purchase, to facilitate the OHTL, and is currently undergoing consultation and review. A total of 313 landowners have been identified for the acquisition of land for the pylon towers, general access and easement and acquisition of Rights-of-Way. The land will be purchased or leased via negotiations with affected land users and owners.

The majority of affected landowners relate to acquisition of Rights-of-Way; however, a small portion of the 313 affected landowners relate to the construction of pylon towers and access; for which the details of the land acquisition are summarized as follows:

- ***New 14km OHTL***: 0.66 ha land, relating to the development footprint of 11 pylons on the new 14km OHTL. There are 21 parcels of land affected, and approximately 30 owners. In addition, 1.25 ha of land is being acquired or leased for general access to the pylon locations; which involves approximately 65 owners, some of which are common with the above pylons.
- ***Modified c.5km OHTL***: 0.08 ha of land, relating to the development footprint of 3 pylons on the new c.5km modification of the existing OHTL. There are 6 parcels of land affected, and 6 owners. In addition, 0.05 ha of land is being acquired or leased for general access to the pylon locations; which involves 1 owner, common with the above (pylons).

The above land acquisition is expected to be completed under a 'willing-buyer willing-seller' approach for all above mentioned owners and is expected to be concluded in October. In the case, land cannot acquired on a willing seller-willing buyer basis, expropriation will be carried out in accordance with the Land Acquisition and Resettlement Framework developed in line with the EBRD's PR 5 and Resettlement Guidance and Good Practice7.

In addition to the above land acquisition, a total of 20.55 ha will be leased for the right of overhead passage of the OHTL towers. No physical or economic displacement will occur as a result of the OHTL towers.

In both the purchase and leasing of land, the agreed value will be provided based on 'fair market price' of the affected assets, without depreciation, and include the cost of any building materials (if any), cost of labour and other related administrative expenses (notary fees, taxes, etc.).

6.2 Social Interaction & Community Health and Safety

Worker Influx & Social Interaction

Approximately 365 workers will be required during the construction phase. It is expected that the majority will be from the local area. As such, there will be no need for construction camps for foreign workers, and it is anticipated that there will be relatively limited impacts associated with worker influx. The operational workforce is significantly smaller (25 no. workers).

7 EBRD's Resettlement Guidance and Good Practice , Available at : resettlement-guidance-good-practice.pdf

Notwithstanding the above, project-specific risk assessments have been undertaken, covering potential Community Risks, including:

- Communicable Diseases / Illness Risk Assessment; and,
- Covid-19 Risk Assessment;

A project-specific ***Community Code of Conduct*** will be developed, and all workers (direct and indirect) will be provided training on this during the site induction process.

The Client is well established in the local area, having constructed Agios Nikolaos I, and the Sithya Co-generation (CHP) plant. There is an established relationship between the Agios Nikolaos Industrial facility and local communities; which will be of significant benefit to the development of the Project.

6.3 Cultural Heritage

In relation to the **CCGT Footprint**, the land does not fall within an archaeological site or monument. Furthermore, it is noted that no significant archaeological finds were recorded during the construction of the adjacent facilities within the Agios Nikolaos Complex, and given the developed nature of the project site, the chance encounter of significant archaeological finds is considered to be low.

In relation to the **OHTLs**, approximately 1,500m of the new 14km OHTL, including 4 high-voltage electricity pylons, within *Protection Zone B* of the Monastery of Hosios Loukas which is a UNESCO site. According to the Ministerial Decree published in Government Gazette 287/AAP/13.9.2012, the construction of new above- or below-ground utility networks is permitted in *Protection Zone A* which has a greater protection status when compared to Protection Zone B. Therefore, the new OHTL is compatible with the established boundaries of archaeological areas. This is illustrated below:

Figure 6: Overview of New OHTLs, including Section within the UNESCO Protection Zone B and other notable Cultural Heritage Points.

Notwithstanding the above, a ***Chance Find Procedure*** shall be developed and implemented during works.

WHAT WILL BE THE KEY ENVIRONMENTAL IMPACTS OF THE PROJECT AND HOW WILL THEY BE MITIGATED?

The potential impacts of the project and the key areas of mitigation are presented overleaf:

Table 9. Environmental Impact Summary & Key Mitigation

Environmental Impact	Impact Overview	Summary of Mitigation Measures
Climate Change	The Project will result in the emissions of Greenhouse Gases (GHG).	▪ Minimisation of GHG Emissions through the use of efficient and modern CCGT technology. The projected carbon intensity ($332gCO_2/kWh$) is a significant improvement over the current Greek Grid Factor of 600+. gCO_2/kWh. ▪ The project is capable of operating on hydrogen (H_2) blended fuels, which also provides an opportunity to further reduce the carbon emissions of the project overtime.
Air Quality	**Operational Impact** The long term (operational) impacts of the Project have been assessed using numerical modelling (AERMOD) and risk assessment against European (EU Directive 2008/50EC) and Greek Regulations relating to Ambient Air Quality Guidelines (whichever is most stringent). The assessment considers the cumulative effects of the existing facilities. The findings of the impact assessment confirm that the Project will not give rise to significant effects on NOx or NO_2 concentrations, within the existing settlements or biodiversity receptors (e.g. NATURA 2000 designated sites). **Construction Impact** Construction period has the potential to generate short term impacts, particularly the generation of dust.	▪ ***Air Quality Management Plan*** to be prepared across construction and operational phases, to describe air quality limits and detail methods to minimise impacts. ▪ ***Ongoing Ambient Air Quality Monitoring*** will be undertaken, in accordance with the above Air Quality Management Plan. For instance, this may include nitrogen dioxide (NO2) diffusion tube monitoring at key locations, with monthly tube changes. ▪ ***Continuous Emissions Monitoring System*** (CEMS) will be installed on the Project's main emission stack. CEMS will allow instantaneous measurement of the primary pollutants of concern, as well as other exhaust parameters, in order to ensure that the plant operation remains within accepted criteria.
Noise & Vibration	Noise and vibration impact assessment under the ESIA, including computational modelling using international best practice, has not identified significant long-term impacts as a result of the project. In particular, modelled impacts at the nearest sensitive receptor are found to be within World Bank Group thresholds. In relation to construction phase, the impacts are considered routine for projects of this nature, and readily manageable through routine Construction Environmental and Social Management Plan (CESMP) practices.	A CESMP will be developed for the project; which shall include specific protocols for noise monitoring and management.

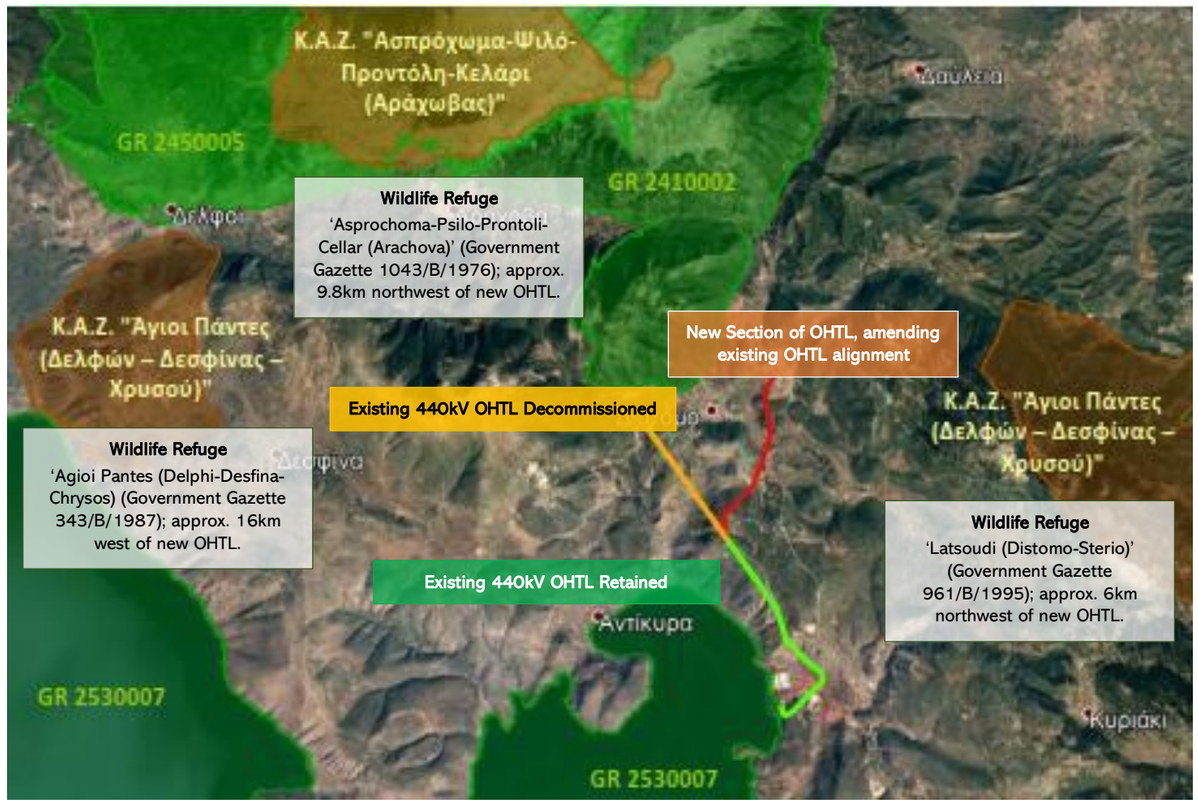
Table 9. Environmental Impact Summary & Key Mitigation

Environmental Impact	Impact Overview	Summary of Mitigation Measures
Water Resources	The most significant consumption of water is for cooling; with the project requiring a supply of up to 2,284m^3/h. This comprises make-up for the following water losses: ▪ Evaporative Losses from the cooling towers, which account for 534m^3/h (23%); and ▪ Blowdown, which is required to maintain the coolant properties, and accounts for 1,750m^3/h (77%). This water will be provided by the SIthya Co-generation (CHP) plant's cooling water discharge, which in turn, is abstracted from the sea. ***The Project will not require any additional sea water abstraction, over and above the current baseline***. Furthermore, the Project will result in a net reduction of the thermal load being discharge to the sea; as a result of water losses diverting 2,284m^3/h, which would otherwise be discharged. In the context that the abstractions are sourced direct from the sea (as opposed to a captive water body); there is no risk of depletion.	▪ ***Regular Efficiency Auditing (including Water)*** in order to identify potential savings. It is noted that whilst no water will be discharged into the sea from the Project; the Sithya plant already has an ongoing discharge monitoring system in place; which will continue to monitor sea water discharge which is not utilized by the Project.
Wastewater Management	A shared wastewater treatment plant is operational at the site, which includes capacity to treat the Project's industrial wastewater. Discharge is monitored (pH, Total Suspended Solids (TSS), temperature, and heavy metals). A shared biological treatment plant is also available for sanitary waste. ***The project does not require any further / new facilities are required.***	Wastewater produced by the project will be treated at the existing wastewater treatment plant, which is a shared facility on the industrial complex. The additional discharge resulting from the Project will not exceed the overall discharge volumes permitted under the current license Sanitary waste will be treated at the existing biological treatment plant. **Whilst not under the direct ownership / operation of the Project; the Project shall liaise and monitor compliance of the Wastewater Treatment Plant to confirm compliance with the Licence requirements.**
Waste Management	The projected waste arisings and impacts are in line with developments of this nature, and no specific high risks have been identified. The EIA provides a comprehensive forecast of the anticipated waste streams. In the case of both non-hazardous and hazardous waste, solid wastes will be collected and stored in dedicated areas and then disposed of at appropriately licensed solid waste facilities, in accordance with the provisions of prevailing national and European legislation for solid waste management.	▪ ***Site Waste Management Plan*** to be prepared and implemented by the EPC Contractor. ▪ ***Duty of Care Records*** to be retained to demonstrate the appropriate disposal of waste,

Table 9. Environmental Impact Summary & Key Mitigation

Environmental Impact	Impact Overview	Summary of Mitigation Measures
Geology and Land	No key impact area will be present, though controls need to be in place, particularly during construction. It is noted that the CCGT will be developed within the existing industrial complex.	▪ ***Spill Response Plan*** to be prepared and implemented by the EPC Contractor. ▪ ***Bulk Oil Containment*** during operation to follow best practices, including bunding / containment,
Ecosystems and Flora & Fauna	**CCGT Development Footprint** The CCGT EIA has been informed by a thorough desk study and field surveys. The field surveys have comprised marine surveys targeted to the qualifying habitats and species of the Gulf of Corinth Site of Importance for Nature Conservation (SINC), which is located immediately adjacent to the proposed development. There is one further Protected Area within 20km of the site (*Oros Parnassos* Special Protection Area (SPA)) although this is c. 9km from the proposed and without any notable connectivity identified (the SPA extends across a mountainous area). A detailed assessment of impacts to the Gulf of Corinth SINC (an '***Appropriate Assessment***') has been undertaken, in line with the requirements of the EU Habitats Directive (HD). This assessment is underpinned by a detailed literature review and a suite of marine ecology surveys undertaken to identify qualifying features that may be subject to impacts associated with the proposed development. ***No significant impacts will occur in relation to the NATURA 2000 sites. In particular, the CCGT project will not result in significant adverse impacts upon the marine environment.*** **Overhead Transmission Lines (OHTLs)** The EIA for the new OHL describes a common bird assemblage to be found along the route including Eurasian magpie and Scops' Owl. The alignment of the OHTLs and location of the OHTLs and their relation to the nearest protected sites and biodiversity designations, is shown overleaf. The OHTL EIAs conclude that there is no significant risk to biodiversity.	**CCGT Development Footprint**: No specific further measures, other than adoption of good practice for the management of latent biodiversity risks, is required with respect to the CCGT development footprint. **Overhead Transmission Lines (OHTLs)**: The EIAs for both the OHTLs have been submitted, subject to consultation, and are approved by the Greek Determining Authority. The EIA work does not identify any significant biodiversity impacts, and in particular, the OHTL will not impact upon significant national/international flyways. As the project progresses, additional reviews and surveys will be undertaken to verify the EIA findings. ▪ ***Ongoing Review of Publicly Available Data*** Neighboring wind farm developments may be a source of additional data on local biodiversity; and can further inform the implementation of the OHTLs. This will be reviewed as part of the Company's EHS management system. ▪ As part of ESH management additional surveys and review will be undertaken and mitigation measures in line with the Company's corporate EHS management practices implemented, if required.

Figure 7: Biodiversity Setting / Receptors relating to new 440kV OHTL (top and bottom left) and Amended OHTL (top and bottom right)



General Notes (Top Left & Top Right)

Red Line routing of new 14km 440kV OHTL.

GR 2530007 'Gulf of Corinth' NATURA 2000 designation.

GR 2450005 'Southeast Parnassos / Parnassos National Park – Tthoreas Forest', which is a designated *Special Conservation Area* (SCA), located approximately 9.5km from the new OHTL.

GR 2410002 'Parnassos National Park', which is a designated *Special Protection Zone* ('ZEP' or 'SPA'), located approximately 1,600m northwest of the new OHTL.

In addition, there are a number of **Wildlife Refuges** in the vicinity of the OHTL – these are **highlighted brown** and annotated on the image.

Indicative areas for ongoing risk management in line with Corporate EHS System

Generally, the biodiversity impacts along the OHTLs – are limited. Neither OHTLs fall within the Natura 2000 site or any migration route for birds.

As part of ESH management additional surveys and review will be undertaken and mitigation measures in line with the Company's corporate EHS management practices implemented, if required.

WILL THE PROJECT RESULT IN ANY TRANSBOUNDARY ENVIRONMENTAL IMPACTS?

The Project is located c.250km from the nearest international border (Albania, to the north), and as such, the Project will not result in any significant transboundary environmental impacts

Therefore, the Project will not trigger ESPOO Convention Criteria.

HOW WILL THE PROJECT ENSURE EFFECTIVE MANAGEMENT AND MONITORING OF IMPACTS?

MYTILINEOS has produced an ***Environmental and Social Management and Monitoring Plan*** (ESMMP) for the project and will maintain a close supervision of Contractors to ensure compliance against these plans, and the general requirements of the EIA. These documents will be maintained as a live document

In addition, a project-specific ***Environmental and Social Action Plan*** (ESAP) has been developed and agreed between EBRD and MYTILINEOS.

The Project will also be subject to ***Independent Monitoring & Audits*** in accordance with the above ESAP requirements. The scope of the independent audits will include the implementation of the project ESMMP, and evaluation of on-site activities, document controls and monitoring activities, with respect to the Project's compliance obligations.

STAKEHOLDER ENGAGEMENT PLAN (SEP)

A project-specific ***Stakeholder Engagement Plan*** (SEP) has been developed with the objective of identifying key stakeholders and ensuring that, where relevant, they are informed in a timely manner of the potential impacts of projects. Stakeholders could be individuals and organisations that may be directly or indirectly affected by the project either in a positive or negative way, who wish to express their views.

The SEP also identifies a formal grievance mechanism to be used by stakeholders (internal and external) for dealing with complaints, concerns, queries and comments. It will be reviewed and updated on a regular basis. If activities change or new activities relating to stakeholder engagement commence, the SEP will be brought up to date. It will also be reviewed periodically during project implementation and updated as necessary. The SEP includes the following:

- Public consultations and information disclosure requirements;
- Identification of stakeholders and other affected parties;
- Overview of previous engagement activities;
- Stakeholder Engagement Programme including methods of engagement and resources; and
- Grievance mechanism.

FURTHER INFORMATION

Contact information for this project is provided below:

MYTILINEOS S.A
Athens (Head) Office
8 Artemidos Street
Maroussi,
Athens, Greece

Contact Name: Georgia Tsompanidou
Telephone: 2103448321, 6980709741
Email: georgia.tsompanidou@protergia.gr
Website: www.MYTILINEOS.gr

Agios Nikolaos (Project) Office
Agios Nikolaos IPP2 CCGT
Agios Nikolaos Industrial Centre,
Boeotia, Greece

Contact Name: Georgia Tsompanidou
Telephone: 2103448321, 6980709741
Email: georgia.tsompanidou@protergia.gr
Website: www.MYTILINEOS.gr

Copies of the Environmental and Social Impact Assessment will be publicly available at the above addresses and are available on the internet at the web address above.

APPENDIX A:

ANALYSIS OF BEST AVAILABLE TECHNIQUES

Introduction

The Project has been designed to comply with Best Available Techniques (BAT) requirements, by virtue of Greece being an EU Member State, and also, through financing by EBRD.

The Project falls under the scope of the EU Industrial Emissions Directive (IED)8 , Annex I, as follows:

1. **Energy Industries**

   1.1 Combustion of fuels in installations with a total rated thermal input of 50MW or more.

The Project CCGT actively comprises a Large Combustion Plant (LCP), which is defined in Article 28 of the IED as "*any combustion plant with a total rated thermal input which is equal to or greater than 50MW, irrespective of the type of fuel used*". There are a number of exclusions from the scope of LCP, such as gas turbines and engines used on offshore platforms; however, no such exclusion applies to the Project.

The IED defines minimum requirements for LCP under the special provisions laid down in Chapter III and mandatory maximum Emission Limit Values (ELVs) in Annex V.

Since the publication of the IED, what constitutes Best Available Techniques (BAT) – i.e. ***technology and operational practices to prevent or minimise emissions or impacts on the environment*** - has evolved, and as such, the performance levels required to demonstrate BAT have also evolved.

The European Commission produces *Best Available Technique Reference Documents* – or BREF Notes – which contain BAT conclusions (BATc) for specific industries and define emission limits associated with BAT AELs (BAT Associated Emission Levels). New BAT conclusions for LCP were published in August 20179 and the accompanying revised BREF document was published in December 201710. These documents update the performance requirements set out under the IED, and generally follow a 4-year review cycle.

The key issues for the implementation of IED LCP using gaseous fuels are:

- Emissions to Air; and
- Energy Efficiency.

In relation to the broader BAT considerations relating to technology selection; the Project's choice of technology (including cooling technique), is considered to be justified, reasonable and materially aligned with BAT; taking into account the country-specific constraints, demands and power sector experience. Further information on the technology selection is provided under the Project EIA.

Emissions to Air

Based on the selected technology, as defined by the BATc, LCP are required to implement particular BAT techniques and meet specific standards for emissions to air of Nitrogen Oxides (NOX) and Carbon Monoxide (CO), as defined in the BREF Note. These

[8] The Industrial Emissions Directive ('IED'), 2010/75/EU.

[9] Conclusions on Best Available Techniques (BATs) for Large Combustion Plants (LCPs), Commission Implementing Decision (EU) 2017/1442, 31 July 2017.

[10] Joint Research Centre (JRC) Science for Policy Report, *Best Available Techniques (BAT) Reference Document for Large Combustion Plants*, EUR 28836 EN, December 2017.

techniques and standards are detailed under the sections below, together with their applicability and current design-compliance.

In order to prevent or reduce NOX and CO emissions to air from the combustion of natural gas in gas turbines, BAT is to use one, or a combination of, the techniques provided in the table below

Table A1: Generally Applicable BAT Techniques for NOx and CO Emission Abatement, Applicability & Compliance

Technique	Adopted in Project?	Proposed Mitigation Measures	WSP Comment
Techniques for the Abatement of NOx Emissions			
Advanced Control System	Yes	The Project is utilizing latest advanced technology, state of the art 9H-Class Gas Turbine. Advance Control systems for the Gas Turbine and water-steam cycle is being applied for the Project.	**Compliant with BAT**
Water / Steam Addition	N/A	Not applicable for Dry Low NOx (DLN) burners; which are adopted at the Project.	Not Relevant due to the use of DLN technology.
Dry Low-NOx Burners (DLN)	Yes	For new GTs, DLN burners are BAT. These have been included within the Project.	**Compliant with BAT**
Low-load Design Concept	Yes	The performance guarantees require emissions levels performance from a minimum load of 50% to 100% base load.	**Compliant with BAT**
Low-NOx Burners (LNB)	N/A	See DLN, above.	Not Relevant due to the use of DLN technology.
Selective Catalytic Reduction (SCR)	N/A	SCR system is not required in order to meet guaranteed emission limits.	Not Relevant as BAT AEL aligned Performance Guarantees can be achieved without the need for secondary abatement.
Optimised Combustion	Yes	The 9H class technology incorporates advanced pre-mixer technology based on miniaturized tubes functioning as “fast” mixers. This miniaturization enables premixed combustion (DLN) for gaseous fuels with higher reactivity, swirl elimination and improved “spatially distributed” uniformity for lower NOx capability at H-class firing temperatures.	**Compliant with BAT** The Project will include Advanced Combustion Control to ensure maximised combustion of natural gas for heat output. This will also have the effect of ensuring controls on CO generation.
Oxidation Catalysts	N/A	Not applicable since the CO emission levels are guaranteed to achieve BAT AELs.	Not Relevant as BAT AEL aligned Performance Guarantees can be achieved without the need for secondary abatement.

The applicable BAT AELs are summarised below, against the Project’s Performance Guarantees:

Table A2: Comparison of BAT AELs (NOx and CO) against Project’s Performance Guarantees

Pollutant	Plant Operation	Period	BAT AEL (mg/Nm^3)	Project Performance Guarantee (mg/Nm^3)	WSP Comment

NOx	Combined-Cycle	Daily	40[A]	30[A, B]	**Compliant with BAT** Performance guarantee and permitted emission limits from the Ministry of Energy and the Environment align with BAT AELs. Should hydrogen be adopted on the project it is expected that these emission limits can be met up to approximately 50% hydrogen use.
		Yearly	30[A]		
CO	Combined-Cycle	Yearly	30	30 [A, B]	**Compliant with BAT** Performance guarantees and permitted emission limits from the Ministry of Energy and the Environment align with BAT AELs.

A For plants with a net electrical efficiency (EE) >55%, a correction factor may be applied to the higher end of this range, corresponding to [higher end] x EE / 55, where EE is the net electrical energy efficiency or net mechanical energy efficiency of the plant determined at ISO baseload conditions.

B Limit calculated as [30] x63.1 / 55 = 34mg / Nm3 in DECISION OF THE GENERAL DIRECTOR OF ENVIRONMENTAL POLICY RIS SUBJECT: Amendment of no. prot. YPEN / DIPA / 82557/5356 / 17.09.2019 Approval Decision Environmental Terms, of the project "Construction and Operation of a New Production Station Electricity of the company MYTILINEOS SA / TED Electricity (former PROTERGIA SA) at the Existing Energy Center of Agios Nikolaos, Boeotia ", regarding its rated power from 775 MW to 826 MW.

In conclusion, the Project is currently aligned with BAT-AELs through performance guarantees in document Firm proposal 1326865 (07/19) as well as through the permitted emission limits within the Environmental Licence issued by the Ministry of Energy and the Environment.

Energy Efficiency

The Project's Power Purchase Agreement (PPA) requires a minimum 60% Net Electrical Efficiency, which is reflected in the Environmental Licence which states a **Net Electrical Efficiency of 63.1%** based on the information provided with the submission.

As discussed within the NTS, were Carbon-Capture-Storage (CCS) to be implemented; on the assumptions based on current available technology, a reduction of up to 10% efficiency could occur, which would take the plant below the bottom end of the BAT-AEL range. As such, any future potential feasibility analysis regarding CCS will need to take account of the broader integrated plant performance impacts.

The IED LCP are required to implement particular 'Best Available Techniques' and meet specific standards for energy efficiency, as defined in the BREF note. These techniques and standards are detailed overleaf, and their applicability reviewed in relation to the Project.

Table A3: General BAT Techniques for Energy Efficiency

Technique	Adopted in Project?	Proposed Mitigation Measures	WSP Comment
Combustion Optimisation	Yes	The 9H class technology incorporates advanced pre-mixer technology based on miniaturized tubes functioning as "fast" mixers. This miniaturization enables premixed combustion (DLN) for gaseous fuels with higher reactivity, swirl elimination and improved "spatially distributed" uniformity for lower NOx capability at H-class firing temperatures.	**Compliant with BAT** The Project will include Advanced Combustion Control systems, which will manage the process to ensure maximised combustion of natural gas for heat output.
Optimisation of the Working Medium Conditions	Yes	Plant will operate with high pressure, intermediate pressure and low-pressure systems.	**Compliant with BAT** The PPA for the project sets a limit to achieve a Net Electrical Efficiency of 60% which is in line with BAT Guidelines (54 – 60.5%). The methods by which this will be achieved will be established via the further design process; however, many applicable methods are available for selection.
Minimisation of Energy Consumption	Yes	Triple Pressure Re-heat system is being used for the water-steam cycle configuration. System has optimized in order to reach best efficiency at Power Plant Contracted capacity.	
Pre-heating of Combustion Air	Yes	Such systems are only economical in case there are free and good low-value heat source available (e.g. process waste heat, vented low-pressure steam). Since the source is not applicable, such system is not applicable.	
Fuel Pre-heating	Yes	Fuel Gas conditioning and heating can be applied with heat recovered from condensate system if required.	**Compliant with BAT**
Advanced Control System	Yes	Advance monitoring and control systems for Combustion is applicable for the Project.	**Compliant with BAT**
Feed-water Pre-heating using Recovered Heat	Yes	Feed water pre-heating system is adopted for the Project.	**Compliant with BAT**
Advanced Materials	Yes	Advanced materials with special coated rotating and stationary blades are applicable for the 9H Class.	**Compliant with BAT**
Combined-Cycle	Yes	The Project is using Gas Turbines in combined-cycle mode for electricity production.	**Compliant with BAT** Agios Nikoloas CCGT is designed to operate in combined-cycle mode with no open-cycle operation.
Heat Recovery by Co-generation	N/A	The Project is being implemented as heat recovery in order to generate electricity but not for district heating.	Not applicable to the Project. Existing Sithya Co-generation (CHP) plant to meet local heat demands.
CHP Readiness	N/A		
Flue Gas Condenser	N/A		
Heat Accumulation	N/A		

Table A3: General BAT Techniques for Energy Efficiency (Cont.)

Technique	Adopted in Project?	Proposed Mitigation Measures	WSP Comment
Wet Stack	N/A	Only applicable to combustion plant fitted with wet Flue-Gas Desulphurisation (FGD).	Not applicable to the Project.
Cooling Water Discharge	N/A		
Fuel Pre-Drying	N/A	Not applicable to natural gas fired CCGT. Only applicable to the combustion of biomass and/or peat.	Not applicable to the Project.
Minimisation of Heat Losses	N/A	Only applicable to solid fuel-fired combustion units and gasification / IGCSS units.	Not applicable to the Project.
Steam Turbine Upgrades	N/A	The project will be a new CCGT construction, requiring no upgrades to improve efficiency from commissioning.	Not applicable to the Project.
Super-Critical and Ultra-Supercritical Steam Conditions	N/A	Not applicable to CCGT.	Not applicable to the Project.

In conclusion, the Project's Energy Efficiency (63.1%) is above the top end of the BAT Guidelines of 54 – 60.5% for new CCGT Plant (>600MWth).

Conclusion

The Project is aligned with BAT requirements; particularly relating to NOx and CO AELs; as well as Net Electrical Efficiency targets. The Project's efficiency characteristics are 'competitive' within the market and representative of modern, high-efficiency technology.

APPENDIX B:

Carbon Capture Storage (CCS) Readiness Review

Carbon Capture and Storage Assessment

The Directive on the geological storage of carbon dioxide (Directive 2009/31/EC) (the Carbon Capture and Storage (CCS) Directive) in the Official Journal of the European Union and came into force on 25 June 2009.

This Directive requires operators of all combustion plants with an electrical capacity of 300 megawatts (MW) or more (and for which the construction / operating licence was granted after date of the CCS Directive) have assessed whether the following conditions are met:

- Suitable storage sites for carbon dioxide (CO_2) are available;
- Transport facilities to transport captured CO_2 to the storage sites are technically and economically feasible; and
- It is technically and economically feasible to retrofit for the capture of CO_2.

Space Requirements

For CCGT units with post-combustion CO_2 capture an indicative CCS space requirement of 1.875ha for 500MW is considered the minimum appropriate size. This would mean that for the Project (829 MW), the space requirement would be 3.109ha.

Additional site-specific analysis by the Lenders' Technical Advisor (LTA) indicated that the space requirement could be reduced, possibly as far as 1.7ha. This would be subject to further detailed analysis; but is indicative of the potential space requirements.

Whilst there is relatively limited space available in the immediate vicinity of the plant; there is available space on a plateau area nearby. Use of this plateau would require pipework to be routed up, or around, a cliff face with an inactive fault.

Technical Feasibility of Retrofitting

Several CO_2 capture technologies currently exist and at the time that this is required to be retrofitted the choice of potential technologies could be greater. The best of the currently available technology options is the capture of CO_2 from flue gases which is post-combustion CO_2 capture via chemical absorption using amine solvents.

For the Project, given the area where space is available for any carbon capture equipment, on a plateau area nearby to the plant rather than the valley floor, it would require pipework (flue gas and cooling water) to be routed up or around a cliff face and inactive fault.

This could have a significant pumping requirement given the height difference.

For the Project, there would be scope to duct the flue-gases from the stack, to the gas cooling system of the CO2 capture plant. This can be done in one of two ways:

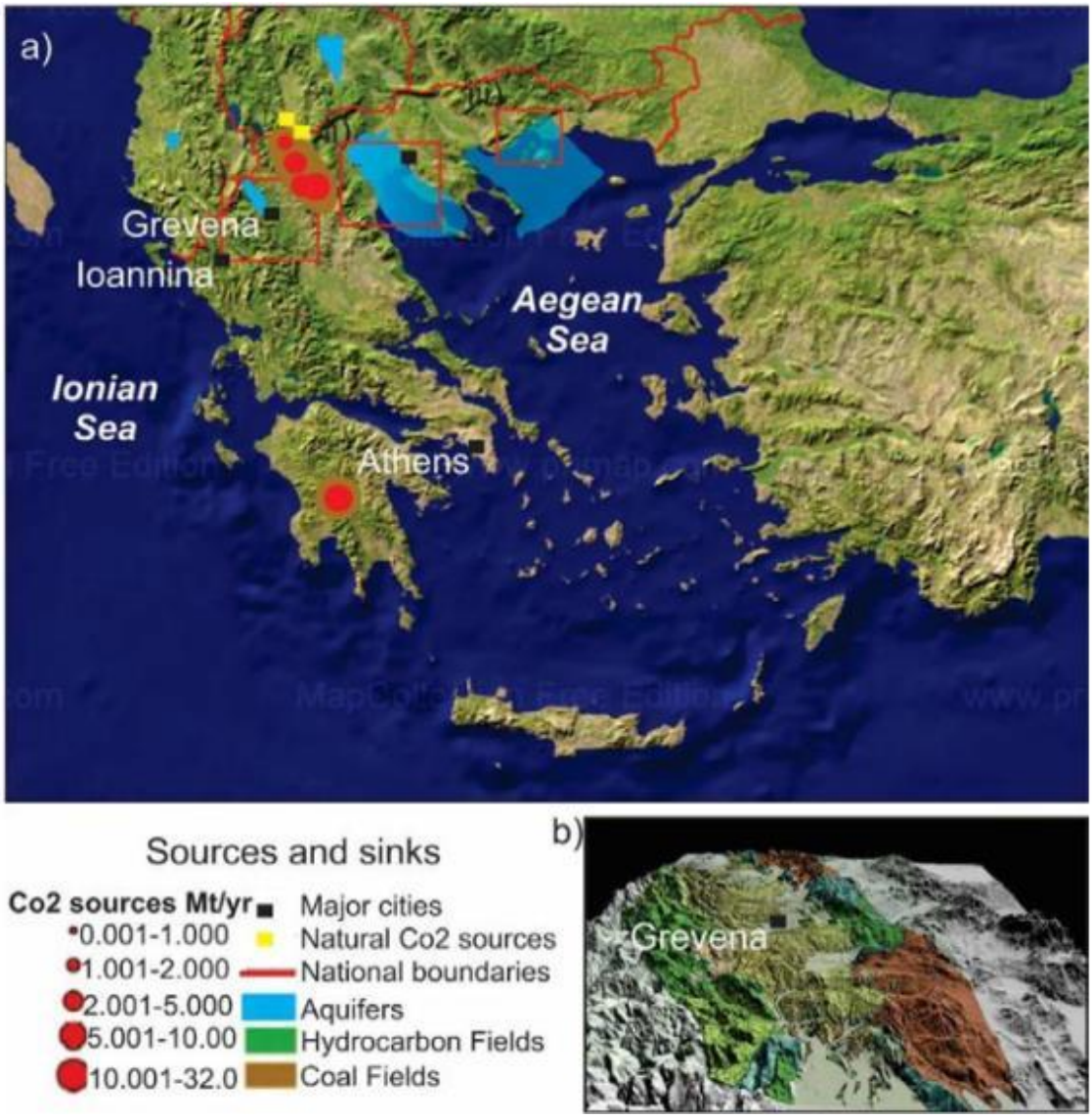
- firstly, including in the design the connection point from where the final flue-gases could either be diverted to stack- or gas-capture plant; or
- secondly, this could be retrofitted afterwards, but would require the plant to be down whilst it is reconfigured to diver the flue-gas.

Storage

CO_2 storage potential in Greece concerns mainly aquifers and a few hydrocarbon fields. The potential for CO_2 storage in oil and gas fields in Greece lies offshore, in the Prinos-Kavala basin, in NE Greece, whereas the biggest share of the point source CO_2 emissions come from northwest Greece[11].

The below figure shows the potential geological storage locations for carbon which project region in the red circle, along with the gas production facilities. This shows that the facilities for the production of gas are not in close proximity to the proposed project site.

Figure B1: Potential CO_2 Storage Locations, Greece



[11] CO_2 storage capacity estimate in the lithology of the Mesohellenic trough, Greece Alexandros Tasianasa,*, Nikolaos Koukouzasa 2016

Transport

Given the likely volume of CO2 that will be produced by the Project, road transportation is unlikely to be a viable option; and pipeline transportation is likely to be the most appropriate solution. Based on current land use, it is does not yet appear to be sufficient land access nearby for the pipeline corridor, particularly given that a corridor of c.1km width would be required, increasing to c.10km near the site.

Aside from land access, there are other factors – such as technical design; planning; permitting; and environmental considerations – that will need addressing at the time of any future CCS retrofit.

Economics

As part of a carbon capture feasibility assessment the likelihood that carbon capture will be economically feasible within the power station's lifetime covering retrofitting of capture equipment, transport and storage should be considered.

This economic consideration should include the efficiency penalties that arise from the operation of the carbon capture equipment from:

- Significant consumption of electricity through the operation of plant and machinery as well as pumps and blowers.
- Post-combustion CO_2 capture technology using amine solvent requires steam to regenerate the liquid amine solvent.
- Substances such as NO_2, particulate matter and SO_2 have a detrimental effect on the CO_2 capture technology. The effects range from reduction in efficiency (lower capture rates) to the generation of solids which require filtration and addition of makeup liquid amine solvent.

Conclusions

Should the economic assessment show that CCS is appropriate for the project; then from a technological viewpoint during its lifetime, this can be implemented. However, there are potential barriers to its implementation which would need further consideration as part of a wider feasibility study.