CarboCap®
CO_2 LIQUEFACTION

DMT OFFER

250090 v1, CO_2 Liquefaction

Your Quality System for CO_2 Liquefaction

To: ENGIE

RENEWABLE GAS SOLUTIONS CREATING A SUSTAINABLE WORLD

dmt

United Kingdom

CONFIDENTIAL

Att.: Mr. Rob McKEON
rob.mckeon@engie.com

Date: June 27, 2025

Subject: Home Farm CO_2 Liquefaction

DMT Reference nr.: 250090 – CCU 1265

Dear Mr. McKEON,

First, we thank you for your continued interest in our products and services. As a result of our discussions about a CO_2 liquefaction plant, we are pleased to present you, our proposal. We hope the enclosed quotation fulfills your expectations.

Once you have had the opportunity to study our proposal, I would be pleased to discuss it with you and your colleagues so that we can fine-tune the offered scope to suit your needs. In the meantime, should you or your colleagues have any questions or require additional information please feel free to contact us so that we can be of further service to you.

Trusting we have made you an interesting offer and I look forward to having the honor of realizing this project in the near future.

Kind regards,

Mr. McCulloch
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1 DMT INTRODUCTION

DMT is a global market leader in state of-the-art technology and custom-made solutions for Renewable Gas Solutions with a strong focus on Biogas deriving from the Agriculture, Waste management- and Industrial Sectors. DMT belongs to Broadview Energy Solutions which is part of Hal Holding N.V.

Hal Holding N.V is a global diversified company with a variety in its portfolio including investments in Boskalis (dredging and offshore energy), Vopak (oil and chemical terminals), Coolblue (online retail), Broadview (sells and distributes natural gas and (bio) LNG, rental fleet for LNG cryogenics, designing and manufacturing cryogenic systems in own factory, designing and building Biogas Upgrading systems), FD Mediagroup, BNR Newsradio and other business information services, Anthony Veder (gas tankers) and TABS Holland (Timber and building products). Net income of HAL Holding N.V. for 2020 amounted to € 629 million.

DMT was founded in 1987 and has its roots in wastewater- and gas treatment products in the waste treatment- and industrial industries. Over the years our company has grown further and specialized to developing, manufacturing, servicing, and focusing on delivering quality equipment for the Biogas Industry in the Agriculture-, Waste Management- and Industrial Segments. With more than 160 references globally DMT is one of the mayor suppliers in the Biogas Upgrading industry.

Our mission is to help customers to clean, optimize and recover gas to generate profit through customer intimacy. Increasingly demanding sustainability criteria's demands solutions to lower the global environmental footprint. Via operational excellence and product leadership by continuously enhancing our products and services, we help our customers to combine productivity and energy efficiency while optimizing profitability.

By delivering a full range of products and services related to biogas upgrading solutions, starting from produced raw biogas, until the final required product and if requested by our customer we are able to bring the product even to the end-consumers, this makes DMT unique in the market. When it comes to customer satisfaction DMT continuously strives to realize a 'best of the best' standard, not just meeting but anticipating and exceeding customers' requirements.

We offer unparalleled customer service and technical support for all our products through custom-made service plans that range from maintenance contracts to comprehensive service level agreements. Our highly motivated and skilled team of specialists in The Netherlands is supported by a worldwide professional network of Sales & Service Offices. To help our customers to achieve maximum plant efficiency, our professionals provide 24/7 technical support by phone, e-mail, or remote service.

3 TECHNICAL PROPOSAL

3.1 PROCESS DESCRIPTION

The first step in CO_2 liquefaction is to control the inlet pressure via modulating valves to ensure the connected upstream equipment is not disturbed. A CO_2 blower can be added to increase the inlet pressure if required. The pressure control is followed by a 2-stage CO_2 compressor which increases the pressure to 18-20 bar. This allows the liquefaction process to take place at relative high temperatures of -20 to -25°C. Temperature increase after each compression stage is cooled using after-coolers and a cooling module.

After compression the CO_2 gas is passed through a drying and purification module which removes water and trace components such as VOC's and H_2S. Using regeneration gas, the module can be continuously operated without replacement of filter material.

When the CO_2 rich gas is conditioned, it enters the CO_2 liquefaction module. The CO_2 rich gas is first pre-cooled in a reboiler after which it is condensed into LCO_2 in the CO_2 condenser. The LCO_2 than enters a stripper column where it is purified by an up-flow of boil-off gas from the reboiler. The LCO_2 is collected in the reboiler sump vessel from where it is pumped into a storage tank via the CO_2 liquid pump.

LCO_2 is stored into a storage tank ready for transfer to LCO_2 trailers for off-loading and export from site. To ensure the right quality of the LCO_2, a quality measurement system can be included in the liquid CO_2 lines and storage tanks.

The boil-off gas from the reboiler and stripper removes the CH_4, N_2 and O_2 impurities from the CO_2 gas which would otherwise build-up into the liquefaction plant. A purge gas line ensures pressure control of the liquefaction module and continuously purges part of the systems volume. Careful control of the purge gas line ensures the highest possible CO_2 recovery rate.

A refrigerant module is included to provide the required cooling capacity to the CO_2 condenser. This closed loop refrigerant system includes the refrigerant compressor package and refrigerant condenser.

3.2 DESIGN CONDITIONS

3.2.1 GAS INLET CONDITIONS

	UNIT	OPERATING RANGE Min. – Max.	DESIGN INLET At battery limit DMT
Flow	Nm^3/h	317 – 647	647
Temperature	°C	15,0 – 30,0	27,0
Dew point	°C	≤ -15,0	-15,0
Pressure	mbar	10 – 200	50
CH_4	% (v/v)	0,0 – 2,0	0,63
CO_2	% (v/v)	95,0 – 100,0	99,13
N_2	% (v/v)	0,0 – 0,5	0,01
O_2	% (v/v)	0,0 – 0,2	0,09
H_2	ppm (v/v)	0 – 8	0
H_2S	ppm (v/v)	0 – 3	1

1) Provided gas must be free of any liquids, foam, or particles.

2) Provided gas at the agreed boundary should be equal to the design values as per Table A.

3) The installation is designed for optimal performance at design values.

3.2.2 LIQUID OUTLET CAPACITIES

	UNIT	MAX	DESIGN
Net Production Capacity	**kg/h**	**1145**	**1145**

3.2.3 UTILITIES BY CUSTOMER

POWER SUPPLY (24/7)	
Voltage main panel	1x 400 VAC, 3 phase + N + PE
Voltage compressor panel	1x 400 VAC, 3 phase + PE
Voltage variation limits	+5% / -5%
Frequency	50 Hz
Frequency variation limits	+/- 1%
Harmonic filtration	Inside LV-Transformer
Electrical power supply system	TN-S
Short circuit current	10 kA
Control Voltage	24 VDC / 230 VAC
COMPRESSED AIR (24/7)	
Pressure	≥ 6,0 bar(g)
Quality Standard	> ISO 8573-1 class 3.3.3
GASES	
Refrigerant (type to be confirmed)	Filling refrigerant system
CO_2	Flushing CO_2 Storage Tanks and Initial start-up
Compressed air	Pressure and leakage tests

3.2.4 GEOGRAPIC- AND CLIMATE CONDITIONS

DESCRIPTION	
Dry bulb temperature (indoor)	Max.: 40°C / Min.: 5°C / Design average: 10°C
Dry bulb temperature (outdoor)	Max.: 35°C / Min.: -18°C / Design average: 10°C
Design temperature cooling equipment [1]	30°C
Site elevation	22 meters above sea level
Seismic activity	None
Wind speeds	≤ 35 m/s
Snow loads	≤ 2,4 kN/m²
Equipment area classification	non-ATEX

1) For temperatures between 30-35 C, the system can be operated at reduced capacity.

3.2.5 OPERATIONAL AND PLANT DATA

CONSUMABLES [3]	
DESCRIPTION	**QUANTITY**
Consumed power	0,185 ±10% kWh/kg LCO_2
Installed power	Approx. 520 kW
EMISSIONS, GASEOUS WASTE	
Purge gas from CO_2 condenser	Approx. 5 – 10% of inlet flow
Regeneration gas	Approx. 2 – 7% of inlet flow
EFFLUENTS, LIQUID WASTE	
Various drains [2]	Approx. 0,1 m³/h

1) Based upon max. 3ppm H2S in gas inlet.

2) Could include traces of feed gas/process.

3) Final operational data is subject to final engineering.

3.2.6 LIQUID OUTLET PURITIES

DMT guarantees the liquid CO_2 purities in accordance with Table C under the condition the gas inlet design conditions are met as per gas inlet conditions where purities are measured at the CO_2 collection vessel.

PURITIES BASED UPON EIGA CODE: 70/17 CARBON DIOXIDE FOOD AND BEVERAGE GRADE, SOURCE QUALIFICATION, QUALITY STANDARDS AND VERIFICATION; Revision of Doc 70/08		
PARAMETER	**NOMINAL VALUE**	**UNIT**
Assay	≥ 99,9	% v/v
Moisture	≤ 20	ppm v/v
Ammonia	≤ 2,5	ppm v/v
Oxygen	≤ 30	ppm v/v
Oxides of nitrogen (NO/NO_2)	≤ 2,5 each	ppm v/v
Non-volatile residue (particulates)	≤ 10	ppm v/v
Non-volatile organic residue (oil and grease)	≤ 5	ppm v/v
Phosphine ***	≤ 0,3	ppm v/v
Total volatile hydrocarbons (calculated as methane)	≤ 50 of which ≤ 20 non-methane	ppm v/v
Acetaldehyde	≤ 0,2	ppm v/v
Aromatic hydrocarbon	≤ 0,02	ppm v/v
Carbon monoxide	≤ 10	ppm v/v
Methanol	≤ 10	ppm v/v
Hydrogen cyanide *	≤ 0,5	ppm v/v
Total sulfur (as S) **	≤ 0,1	ppm v/v
Taste and odor in water	No foreign taste or odor	-
Appearance in water	No color or turbidity	-
Odor and appearance of solid CO_2 (snow)	No foreign odor or appearance	-

* Analysis necessary only for carbon dioxide from coal gasification sources.

** If the total sulphur content exceeds 0,1 ppm v/v as sulphur then the species must be determined separately, and the following limits apply:

- Carbon Sulphide: ≤ 0,1 ppm v/v
- Hydrogen Sulphide: ≤ 0,1 ppm v/v
- Sulphur Dioxide: ≤ 1,0 ppm v/v

*** Analysis necessary only for carbon dioxide from phosphate rock sources.

Where carbon dioxide complies with the specification then by definition the requirements for acidity and reducing substances as required by European Law are met.

3.3 SCOPE OF SUPPLY EQUIPMENT PACKAGES

The CO_2 liquefaction plant is designed to deliver preassembled units manufactured in one of our factories in The Netherlands. During manufacturing the highest quality standards and materials are applied to ensure a lifetime of the plant greater than 15 years. Below a full breakdown of the preassembled units are described.

3.3.1 MODULATING GAS INLET VALVES

The unique process control design of the modulating valves is designed to receive the gas from sources such as biogas upgrading to avoid any production disturbances in those processes. In case an excess CO_2 flow towards the CO_2 plant, or the CO_2 plant is not able to process the full amount, its automatically vented to atmosphere or diverted back to its source.

DMT's Benefits		Customer Advantages	
√	Modulating inlet valves	√	Easy start/stop, no methane production losses
√	Accurate pressure transmitter	√	Full alignment between biogas- and CO_2 plant
√	Cone valve with metal seats	√	Very low maintenance requirements
Type	Conovalves		
Location	Inside or outside, non-ATEX zone		

3.3.2 CO_2 COMPRESSION

Two stage reciprocating, oil free, compressor(s) are applied to avoid oil contamination in the final product which could otherwise result in a reject batch of CO_2. These reciprocating compressors are exceptional energy efficient and are flexible to accommodate process changes. The reciprocating compressors good adjustability enables different suction- and final pressures as well as adaptable volume flow quantities.

DMT's Benefits		Customer Advantages	
√	Oil free compressor(s)	√	No rejected CO_2 batches due to oil free compressor(s)
√	Piping and coolers in stainless steel	√	Long lifetime
√	High efficiency	√	Less power consumption
√	Modulating valve CO_2 discharge temp.	√	Avoidance of overload back-end process
Type	2-stage reciprocating compressor(s)		
Capacity control	Yes, frequency controlled		
Location	Inside, non-ATEX zone		

3.3.3 CO_2 CONDITIONING UNIT

The cooling and dewatering unit is designed to reduce the water content of the CO_2 gas through condensation. It will reduce the water load on the activated carbon polisher to improve the performance. In addition, it also reduces the water load onto the dehydration part which reduces the chance of freezing the CO_2 condenser and thus improve the CO_2 recovery and liquefaction efficiency.

DMT's Benefits		Customer Advantages	
√	Fully automated	√	No manual intervention
√	Smart reduction of water load	√	Reduction of energy consumption
√	High efficiency	√	Reduction of CO_2 consumption during regeneration
1st Heat exchanger	Stainless steel, connected with dry cooler		
2nd Heat exchanger	Stainless steel, connected with chiller		
Location	Inside, non-ATEX zone		

3.3.4 DRY COOLER

The installed equipment must be provided with sufficient cooling medium to cool down the various positions in the process. On purpose a dry cooler is used to create cooling media for the process in a most efficient way. Consumers of the media in the process are the CO_2 compressor(s), compressed CO_2 gas and oil of the refrigerant compressors.

DMT's Benefits		Customer Advantages	
√	Fully automated	√	Low maintenance requirements
√	Fan capacity control via VSD	√	Optimizing energy usage in winter
Material Piping	Stainless steel		
Location	Outside, non-ATEX zone		

3.3.5 CARBON UNIT & REGENERATIVE DEHYDRATION

The carbon unit and regenerative dehydrator is a fully automated system. This unit will pre-clean the CO_2 gas of undesired impurities that affect the quality of the food grade CO_2. The second step is to remove the remaining moisture to prepare the CO_2 for lowering the temperature down towards -30°C to prevent freezing in the system. This system will be executed in full automated dual mode; one unit is running, and the other unit will be regenerated.

DMT's Benefits		Customer Advantages	
√	Fully automated	√	No manual intervention
√	Regeneration cycle	√	Savings on desiccant material
√	Temperature controlled regeneration	√	Energy savings
√	Regeneration with CO_2	√	End product reliability
Materials	Stainless steel vessel(s) and piping		
Insulation	Yes, incl Aluminum cladding		
Location	Inside, non-ATEX zone		

3.3.6 LIQUID CO_2 COLLECTION VESSEL & STRIPPING COLUMN

The CO_2 collection vessel and stripping column is designed to remove the last non-condensable impurities such as N_2, O_2 and CH_4 to achieve the required CO_2 liquid specification. These non-condensable impurities will be removed in the CO_2 condenser by purging these via a special designed venting system. This system is fully automated, embedded, and integral part of the overall system to reach the agreed CO_2 liquid quality.

DMT's Benefits		Customer Advantages	
√	Pre-cooled gas into the CO_2 condenser	√	Energy neutral
√	Integrated heating element	√	Allowance for partial load and start/stops
√	Special stainless-steel packings	√	Highest purities reached
Material Vessel	Carbon steel		
Material Piping	Stainless steel		
Insulation	Yes, incl Aluminum cladding		
Location	Inside or outside, non-ATEX zone		

3.3.7 CO_2 CONDENSER/REFRIGERANT EVAPORATOR

The CO_2 condenser liquefies the incoming CO_2 gas by evaporating the refrigerant at temperatures of ±-33°C. This system is optimally designed to separate, in conjunction with the stripping column and CO_2 collection vessel, the non-condensable gasses from the liquified CO_2 resulting in less CO_2 loss from during purging. An additional buffer vessel can be installed to further optimize production.

DMT's Benefits		Customer Advantages	
√	Shell & plate heat exchanger	√	Less refrigerant required
√	Modulating purge valve	√	Less CO_2 losses
√	Shell & plate heat exchanger	√	Smallest footprint
Material shell	Carbon steel		
Material plate	Stainless steel		
Insulation	Yes, incl Aluminum cladding		
Location	Outside, non-ATEX zone		

1) Sufficient height required to enable gravity feed into the stripping column.

3.3.8 CO_2 LIQUID PUMP

The purified CO_2 collected in the CO_2 collection vessel will be transferred into the CO_2 storage tank(s) by a specially selected liquid pump.

DMT's Benefits		Customer Advantages	
√	Special selected pump	√	No cavitation, creating high uptimes
√	Purpose build pump	√	Ensuring CO_2 storage is fully utilized
√	CO_2 liquid cooled motor	√	Prevents overheating, increases uptime
Material Piping	Stainless steel		
Insulation	Yes, incl Aluminum cladding		
Location	Inside or outside, non-ATEX zone		

3.3.9 REFRIGERANT PACKAGE

The refrigerant package including the compressor is chosen based upon a natural refrigerant, ammonia, or CO_2, which is the most efficient and common industrial refrigerant currently available. This package provides the condensing capacity to liquefy the dry CO_2 gas in the CO_2 condenser. The extracted heat will be transferred to the refrigerant that dissipates the heat directly to an evaporative condenser. The refrigerant system is operating at approximately -33°C and is completely prefabricated.

DMT's Benefits		Customer Advantages	
√	Industrial package	√	High reliability
√	Fully automated	√	Low maintenance requirements
√	Capacity control via VSD	√	Optimizing energy usage in winter
Refrigerant compressor	Screw including VSD and control module		
Location	Inside, non-ATEX zone		

3.3.10 REFRIGERANT CONDENSER

The refrigerant condenser liquifies the high-pressure refrigerant gas coming from the compressors. For optimal performance and energy management of the complete process, a special selected condenser will be provided to regulate on pressure and outside temperature fluctuations.

DMT's Benefits		Customer Advantages	
√	Industrial package	√	High reliability
√	Natural refrigerant	√	Fulfills GWP requirements
√	Outside temp. control dependence	√	Optimized energy usage
Type	Air cooled		
Location	Outside, non-ATEX zone		

3.3.11 MAIN CONTROL PANEL, HMI, AND INSTRUMENTATION

The DMT CO_2 liquefaction plant is fully automated and controlled by a Siemens PLC with a local interface. The local control system with Human Interface (HMI), a **19" display** for proper reading and daily operation, is situated on the electrical cabinet and is built in accordance with the DMT standards.

It allows for easy monitoring of the plant and its instrumentation. The setting- and changing of parameters, including switching between different operation modes (manual control/stop/automatic control) and reset of alarms, can be done using the HMI. Optionally, selected messages (for example occurring alarms) can be sent as an email. The control system can be accessed remotely through a VPN internet connection. Data logging and backups of the settings are made daily. The PLC and safety systems will be connected to an Uninterruptible Power Supply (UPS). The UPS will ensure sufficient time for a safe and efficient shutdown of the local control system during power interruptions.

Network Design according to NIS2 / IEC 62443 requirements.

DMT's Benefits		Customer Advantages	
√	Local control system	√	Easy daily operations
√	Remote access via VPN	√	Enabling full remote support
√	UPS included	√	Security of data back-up and safe shutdown
√	Standard software interface block	√	Easy integration of signals with local control room
Type	Siemens S7		
Display	19" for easy and proper operations		
Location	Inside, non-ATEX zone		

3.3.12 CO_2 STORAGE TANK(S) - OPTION

The produced CO_2 is transferred and stored into CO_2 storage tank(s). The cryogenic storage tank(s) provide CO_2 storage capacity to allow for uninterruptable operation in between offloading periods. The tanks come pre-packaged including pressure safety valves and instrumentation.

DMT's Benefits		Customer Advantages	
√	Fully automatic	√	High plant availability
√	Accurate volume control	√	Multiple days of storage
√	Scalable with multiple tanks	√	Acts as buffer
Type	Horizontal		
Storage	±2 – 3 days single tank		
Materials	Carbon steel + insulation		
Location	Outside within 10 meters of the CO_2 liquefaction plant, non-ATEX zone		

3.3.13 CO_2 OFFLOADING SKID - OPTION

The purified CO_2 stored in the CO_2 storage tank(s) can be offloaded by a specially selected liquid pump.

DMT's Benefits		Customer Advantages	
√	Special selected pump	√	No cavitation, creating high uptimes
√	Purpose build pump	√	Ensuring CO_2 storage is fully utilized
√	CO_2 liquid cooled motor	√	Prevents overheating, increases uptime
Material Piping	Stainless steel		
Insulation	Aluminum cladding		
Location	Outside, next to CO_2 storage tank(s), non-ATEX zone		

3.3.14 CARBOSCAN – OPTICAL ABSORPTION SPECTROSCOPY - OPTION

The optical absorption spectroscopy housed in a separate container, is designed to accurately monitor the CO_2 in the storage tanks and road tanker trucks (prior to connection to the tanks) and to monitor the produced CO_2 quality on the outlet of the CO_2 recovery system. This prevents a contaminated CO_2 storage tank from leaving the liquefaction plant.

DMT's Benefits		Customer Advantages	
√	Optical absorption spectroscopy	√	Easy daily operations
√	Including a vaporizing box	√	Enabling full remote support
√	Separate control panel & software	√	Stand-alone unit
Connection 1	1x measuring point at the CO_2 collection vessel		
Connection 2 + 3	2x measuring points at the LCO_2 storage tanks		
Location	Inside or outside within 10 meters of the storage tanks, non-ATEX zone		

BATCH OPERATION AUTOMATION - OPTION

DMT offers a batch operation automation priced per CO_2 tank. Batch operation automation includes piping, insulation, valves and transmitters and it is needed when minimum *two* CO_2 storage tanks are used.

BATCH OPERATION AUTOMATION	
Material piping	Stainless Steel
Details	4x automated valves per tank
Insulation	Yes, included
Location	Outdoors, non-ATEX zone

CO_2 EVAPORATOR - OPTION

The CO_2 evaporator is used to drain the CO_2 tanks for the regeneration of the regenerative dehydration unit.

CO_2 EVAPORATOR	
Type	Evaporator
Medium	Liquid CO_2
Location	Outdoors, non-ATEX zone

BUILDING

To house the main equipment for the CO2 liquefaction plant, a specially designed building is used. The building will consists of 2 rooms separated by a wall. Both rooms will be installed under a single roof with proper ventilation and conditioning for a safe and optimal performance of the system.

BUILDING	
Panelling	SW80 sandwich panels
Rooms	2x non-ATEX
Overhead doors	One (1) per room
Standard doors	Minimum one (1) per room
Gas detection	CO_2 detection in non-ATEX room

	NH_3 detection in non-ATEX room
Ventilation	Flow controlled ventilation in non-ATEX room
Lights and sockets	Included
Room conditioning	Included

3.4 SCOPE OF SUPPLY ONSITE MATERIALS

DMT can deliver interconnecting materials required for the full onsite works enabling to complete the total project. The supplied materials are based upon standard layout and dimensions as provided in this offer considering pipe and cable lengths are limited to 10m between skids.

3.5 PROJECT ENGINEERING AND MANAGEMENT

DMT assigns a professional project team dedicated to your project. This multi-disciplinary team consists of skilled process-, mechanical-, electrical-, and CAD engineers, supported by a project manager.
The project manager will be your main point of contact for the duration of the project. At the start of the project a kick-off meeting will be arranged with the customer and the DMT project team. A project schedule will be shared, and any project details are communicated.

Engineering phase

During the project's engineering phase, DMT will be preparing 2 sets of engineering packages. These are referred to as Basic Design Package (BDP) and Detailed Design Package (DDP). These packages containing engineering documents such as drawings, P&IDs, electrical diagrams, share information about how the system is designed and provide essential information to integrate the biogas upgrading plant in the overall site.
Part of the engineering phase is the participation in an overall HAZOP meeting. DMT reserves 2 days for participating in an overall onsite interfaces HAZOP with all necessary parties involved. All DMT scope is subject to internal HAZOP procedures.

Production phase

After the engineering phase, the project enters the production phase. In this phase, equipment will be procured, manufactured, and assembled at one of DMTs main fabricators. Monthly progress reports can be shared to show the progress made on the project. At critical milestones during production, a factory acceptance test (FAT) will be organized and attended by the customer. This serves as an opportunity for making minor changes before the system is sent to site.

Buildup and commissioning phase

Once the system arrives on site, the third and final phase of the projects, build-up, and commissioning commences. During this phase, the delivered scope will be installed and connected to the onsite systems and facilities. When the system is mechanically completed, a DMT commissioning team will perform the required tests to validate the system's readiness and performances. During the commissioning, time will be reserved to train new local operators. After training they will receive an official certificate, qualifying them to operate the system.

Start-up and testing phase

When the system is fully installed and commissioned, the system can start operation. A performance and acceptance test will prove the system's compliance with its contractual obligations. A set of DMT certificates are signed off, allowing the systems ownership to be formally transferred to the customer.

After-care

When the biogas upgrading plant is handed over to the customer, internally the project is transferred to DMTs service department. DMT will actively engage with the customer to find a fitting solution for after-care, service, and operational support to your quality system. With a range of service packages, DMT is confident it can keep your system running in the best possible condition throughout its lifetime.

3.5.1 ONSITE PIPING MATERIALS

The following piping materials such as pipes, T-pieces, reducers, sockets etc. are included in the scope of supply:

- Interconnecting piping between the offered scope based upon the agreed layout.
- CO_2 and utility piping are executed in stainless steel, refrigerant piping can be executed in carbon steel;
- Supports, pipe clamps, special insulation clamps in accordance with the agreed layout;
- Piping materials such as main CO_2 supply line from the source is included up to 10m length;
- Piping materials for recirculating gases back towards the main source is not included;
- Piping materials for blow-off lines, drain connections and CO_2 piping to and from the storage tanks is included.

3.5.2 ONSITE INSULATION MATERIALS

The pre-packaged units are pre-insulated in case it's possible, however, some items will be insulated onsite.

Our scope for insulation consists of the following items:

- CO_2 condenser (cold insulation);
- Liquid CO_2 collection vessel & stripping column (cold insulation);
- CO_2 liquid pump (cold insulation);
- CO_2 & refrigerant piping (cold insulation);
- Glycol piping (cold insulation);
- Regenerative dehydrator & carbon unit (heat insulation).

3.5.3 ONSITE ELECTRICAL MATERIALS

DMT's pre-packaged units will be pre-cabled in our factories before arriving at the customer facility. Once delivered all units must be connected via interconnecting cables and wires required to finalize the project.

Our scope for electrical onsite materials consists of the following:

- Interconnecting cables and wires between the offered scope based upon the agreed layout;
- Cable trays (zinc coated), supports and all required small mounting materials;
- Main power cables from the site power distribution into DMT's main control panel and connection thereof inside the panel is excluded.

3.6 SCOPE OF SUPPLY ONSITE WORKS TURNKEY

For the realization of onsite works DMT is able to deliver options suitable to client requirements. These options, related to manpower, are divided into three parts as per below. The provided works are based upon standard layout and dimensions as provided in this offer considering pipe and cable lengths are limited to 10m between skids.

3.6.1 ONSITE LABOR, TOOLS, AND EQUIPMENT

DMT offers all necessary subcontracted onsite labor, tool, and equipment for the onsite works of the agreed scope of supply. It includes all related works within the agreed layout by pre-selected subcontractors for full completion of the turnkey works.

The works of the onsite subcontracted labor includes the following:

- Qualified welders including tools;
- Fitters including tools;
- Insulators including tools;
- Electricians including tools.

3.6.2 ONSITE SUPERVISOR FOR MOUNTING, INSTALLATION, COMMISSIONING, AND TRAINING

DMT provides a qualified supervisor for the duration of the onsite labor to instruct, guide and realizes the onsite works until final commissioning and training of the full project. It's assumed a week will consist of maximum 50 working hours. DMT assumes that once the equipment is delivered onsite, there are no interruptions for the full duration of execution the project within the agreed timeline. In case there is a delay, not being caused by DMT, additional costs will be charged in accordance with DMT's hourly rates.

The works of the onsite supervisor includes the following:

- Provide guidance of locating and erection of all delivered items;
- Provide guidance of the installation works, piping, cabling, and insulation;
- Hot commissioning the equipment directly after mechanical completion and cold commissioning;
- Training of the appointed operators during hot commissioning in English;
- Handover of the plant after a final performance and acceptance test.

3.6.3 TURNKEY DESIGN PACKAGE

DMT will supply a Design Package (DP) for all related onsite turnkey works related to onsite piping, insulation, and cabling. The package will be prepared in accordance with DMT standard specifications enabling a speedy process.

The design package will include the following:

- Layout drawing and foundation plan including drainage points;
- Electrical schematics including electrical loads;
- Piping isometrics and piping bill of materials;
- Cable bill of materials and cable trays;
- Piping support drawings;
- Insulation specifications.

3.7 SCOPE EXCLUSIONS

The items or services listed below are excluded from the scope of supply. In certain cases, these exclusions may be due to a lack of information preventing design and costing the items and/or related services. In cases items mentioned in the exclusions and a request is raised, for wherever possible we are prepared to submit a quotation for such items upon request.

The following items are excluded from the scope of supply:

- All civil engineering and works;
- Mechanical and electrical installation outside the scope of supply;
- Building, mounting and support structures, foundations, platforms, ladders, and walkways;
- Anchor bolts and fastening/ securing of skids to foundations;
- Onsite earthing and grounding;
- Cranage & unloading onsite / positioning onsite;
- Electrical power for onsite mounting works;
- Lightning protection;
- Scaffolding;
- CO_2 gas buffer;
- Tracing of onsite piping;
- Any penetrations going through walls, roofs or other related routes for onsite works;
- Main power supply cables connecting into control panels or compressors;
- Pipe support structures/cables/communication cables to delivery DMT;
- Condensate pits;
- Internet connection for operating and offsite support to the delivered scope/solution (>20mb/s);
- Connections for drains and blow-off lines from drain- and safety-valves;
- Seismic zone calculations;
- All (non-destructive) testing and approval of local authorities outside skids;
- Fees for permits and licenses required to comply with applicable regulations;
- Site facilities (toilets, office, etc.);
- Gas detection devices in the CO_2 area (CH_4, CO_2, NH_3);
- Disposal of (waste) materials;
- Measures to reduction of harmonics from 6 pulse variable speed drives;
- Supply inert gases for flushing of system and/or operations;
- Supply of dry, clean, compressed air;
- Supply of calibration gases;
- All applicable Duties, Withholding tax (WHT), VAT and all (other) related fees;
- All items and services not explicitly mentioned in this offer are excluded from scope DMT.

It is important that DMT can carry out the offered site works in an unobstructed manner. There shall be sufficient space for the preparation of materials and equipment. The site shall be always accessible for the full duration of the offered site works.

3.8 SERVICE PROPOSAL

To keep your CO_2 liquefaction plant in the best possible condition during its lifecycle, regular maintenance and periodic services are required. Next to the First Level Service, that is performed by your own operators, DMT Environmental Technology can offer you the following different services.

FIRST LEVEL SERVICE

The plant is a user-friendly system used for liquefying CO_2. The installation runs completely automatically but it needs to be monitored and inspected by trained and certified operators. During the hand-over process we include sufficient time to train your personal on the installations. Your operator performs regular checks on the performance of the installation, this is what we call first level service. The checks are recorded in the system logbook. By first level service your operators can signal any process changes and/or organoleptic deviations. Action is required when abnormal process variations occur. Your own operational staff must perform these inspections on a daily/ weekly basis.

DMT STANDARD SERVICE

DMT can offer a standard maintenance service which includes operational assistance, inspection, and preventive maintenance. This paragraph is a comprehensive description of the standard service we are offering.

PROCESS TECHNICAL SUPPORT

When you experience problems with operating the plant or the process does not proceed as expected you can request assistance from our service engineer. Our service operators will answer your call and can login into the operating system of the CO_2 liquefaction plant, supporting your operator on site at a distance at solving the issues.

This service is available during office hours and questions are answered based on urgency. Process technical support during office hours is part of the standard service and can be offered on request.

24/7 HOTLINE

DMT can also offer the Process Technical Support assistance around the clock, 24 hours a day, 7 days a week. Also, during holidays and bank holidays. 24/7 Process Technical Support can be offered on request.

INSPECTION AND PREVENTIVE MAINTENANCE

Inspection and maintenance visits will be performed by two DMT qualified engineers. After 4000 operational hours they will carry out an inspection. After 8000 operational hours they will perform preventive maintenance works too. The wear and tear parts will be replaced. Additionally, after 16000- & 24000-hours further maintenance is carried out for long life-time components. These maintenance visits will be combined with the standard 8000 hours visit. The 8000 hours maintenance visits are the minimum required maintenance to a DMT installation.

WEAR PART

When service is included, DMT will also include wear and tear parts required except for compressor oil and parts for overhauling of equipment. Compressor oil and overhauling parts can be offered on request.

SPARE PARTS

The supply of spare parts is not included in the standard services of the installation. For normal operation we recommend our basic spare part list. For a higher level of security and better availability we recommend also our extended spare part list. These spare part lists will be updated after the detailed engineering phase of the project. Basic and extended spare parts can be offered on request.

APPENDIX A – CODES AND STANDARDS

The CO_2 liquefaction plant is delivered in accordance with DMT's standard design, technical specifications, and standards, which comply with the following (inter)national guidelines and/or legislation if applicable to the design. Other technical specifications, guidelines or standards or legislation are currently not part of this offer.

Code	Description
EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 13849-1	Safety of machinery - Safety-related parts of control systems – Part 1: General principles for design
EN ISO 13849-2	Safety of machinery - Safety-related parts of control systems – Part 2: Validation
EN 60204-1	Safety of machinery - Electrical equipment of machines – Part 1: General requirements
EN 61508	Functional safety of electrical/electronic/programmable electronic safety related systems
EN 61511	Functional safety. Safety instrumented systems for the process industry sector Framework, definitions, system, hardware, and software requirements
EN 62061	Safety of machinery - Functional safety of safety-related electrical, electronic, and programmable electronic control systems
EN IEC 60079-14	Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)
EN IEC 60079-10	Electrical apparatus for explosive gas atmospheres – Part 10: Classification of hazardous areas
2014/30/EU	Electric Magnetic Compatibility Directive
2014/34/EU	ATEX 114
1999/92/EC	ATEX 153
2006/42/EC	Machinery Directive
2014/68/EU	Pressure Equipment Directive
2014/35/EU	Low Voltage Directive

APPENDIX B – DOCUMENT LIST

Documents are important not only for thorough reference work, but also for the (local) agencies to demonstrate how the installation works in operational and security areas. DMT therefore offers our clients extensive documentation as part of our qualitative approach.

Documents[1)]
PFD
P&ID
Layout drawings (2D/3D)
Foundation and drainage
Lifting plan
Zoning/ ATEX drawings if applicable
Electrical drawings and electrical load list
IO list
CE declaration of conformity
Project schedule
Quality and inspection plan
Customer interface list (Mechanical/Electrical/Software)
Equipment list
Process description
Mechanical-, Cold, Hot- and Final Performance and Acceptance Certificate
Installation, Operation and Maintenance manual
Main components supplier manuals

1) The Installation, Operation and Maintenance manual will be provided digital in English.

APPENDIX C – REFERENCES

Nr	Year of Comm.	Project	Country	Capacity (Nm^3/h)	Feedstock	Application
1	2023	Cham	Switzerland	420	WWTP	Gas to grid
2	2023	Le Sueur, MN	USA	1930	Food/Agricultural waste	Gas to grid
3	2023	West-London	UK	1150	WWTP	Gas to grid
4	2023	Echten	Netherlands	529	WWTP	Gas to grid
5	2023	Hagelsrum 2	Sweden	250	Manure	Vehicle Fuel (CNG)
6	2023	Tjuchem	Netherlands	600	Manure/Agricultural waste	Gas to grid
7	2022	Pittsburg, CA	USA	6730	Landfill	Gas to grid
8	2022	Litomysl	Czech Republic	400	Agricultural waste	Gas to grid
9	2022	Warsaw, NC	USA	6520	Waste Resource Recovery	Gas to grid
10	2022	Dublin, TX	USA	1930	Dairy manure	Gas to grid
11	2022	Jessup, MD	USA	1770	Waste Resource Recovery	Gas to grid
12	2022	North-London	UK	1150	WWTP	Gas to grid
13	2022	Bressingham	UK	1102	Manure/Agricultural waste	Gas to grid
14	2022	Raleigh, NC	USA	1045	WWTP	Gas to grid
15	2022	Ellon	UK	600	Industrial (Brewery)	Gas to grid/LCO_2
16	2022	Holwerd	Netherlands	575	Manure/Agricultural waste	Gas to grid
17	2022	Upgrade Nesselnbach	Switzerland	800	Municipal Waste	Gas to grid
18	2022	Tønder	Denmark	950	Agricultural waste	Gas to grid
19	2021	Amsterdam	Netherlands	2050	WWTP	CNG/Gas to grid
20	2021	Tucson, AZ	USA	1120	WWTP	Gas to grid
21	2021	Fremont, NE	USA	800	WWTP	Gas to grid
22	2021	London, ON	Canada	675	Dairy manure	Vehicle Fuel (CNG)
23	2021	Kerteminde	Denmark	720	Manure/Agricultural waste	Gas to grid
24	2021	Långås	Sweden	600	Manure/Agricultural waste	CNG/Gas to grid
25	2021	Delta, BC	Canada	450	Dairy manure	Gas to grid
26	2020	Houston, TX	USA	7230	Landfill	Gas to grid
27	2020	Morris, MN	USA	3154	Dairy manure	Gas to grid
28	2020	Lockerbie	UK	1600	Dairy waste	Gas to grid
29	2020	Sioux City, IA	USA	1300	WWTP	Gas to grid
30	2020	Cambridgeshire	UK	710	Agricultural waste	Gas to grid
31	2020	Brillion, WI	USA	394	Dairy manure	Gas to grid
32	2020	Sturgeon Bay, WI	USA	394	Dairy manure	Gas to grid
33	2020	Campbellsport, WI	USA	360	Dairy manure	Gas to grid
34	2020	Coon Valley, WI	USA	240	Dairy manure	Gas to grid
35	2019	Ashland, KY	USA	6400	Landfill	Gas to grid
36	2019	Luttelgeest	Netherlands	1250	Dairy Manure	Gas to grid
37	2019	Kent	UK	810	Chicken poultry manure	Gas to grid
38	2019	St. Nicolaasga	Netherlands	450	Co-digestion	Gas to grid
39	2019	Zeewolde	Netherlands	350	Co-digestion	Gas to grid
40	2019	Tägerwillen	Switzerland	150	WWTP	Gas to grid
41	2019	Ara Obersee	Switzerland	100	WWTP	Gas to grid
42	2018	Fair Oaks, IN	USA	2400	Dairy Manure	Gas to grid
43	2018	David City, NE	USA	1600	Landfill	Gas to grid
44	2018	Ringsted	Denmark	1400	Agricultural waste	Gas to grid

45	2018	Leeuwarden	Netherlands	850	Agricultural waste	Gas to grid
46	2018	Honolulu, HI	USA	560	WWTP	Gas to grid
47	2018	Viljandima	Estonia	350	Waste, WWTP & Manure	Gas to grid
48	2018	La Coruña	Spain	100	WWTP	CNG/Gas to grid
49	2017	Ringkobing-Skjern	Denmark	1400	Agricultural waste	Gas to grid
50	2017	Nesselnbach	Switzerland	600	Municipal Waste	Gas to grid
51	2017	Hagelsrum	Sweden	250	Manure	Vehicle Fuel (CNG)
52	2017	s-Hertogenbosch	Netherlands	100	WWTP	Vehicle Fuel (CNG)
53	2016	Welbeck	UK	1000	Agricultural waste	Gas to grid
54	2016	Vra	Denmark	650	Agricultural waste	Gas to grid
55	2016	Warmehuizen	Netherlands	500	Agricultural waste	Gas to grid
56	2016	Turgi	Switzerland	100	WWTP	Gas to grid
57	2016	Wetzikon	Switzerland	100	WWTP	Gas to grid
58	2015	Aspatria	UK	1000	Cheese Production Waste	Gas to grid
59	2015	Wyke Farms	UK	1000	Agricultural & Food Waste	Gas to grid
60	2015	Walchum	Germany	300	Digested Agricultural waste	Gas to grid
61	2015	Buchs	Switzerland	100	WWTP	Gas to grid
62	2014	Mitcham	UK	1000	Agricultural waste	Gas to grid
63	2014	Fraddon	UK	1000	Agricultural waste	Gas to grid
64	2014	Great Hele	UK	1000	Agricultural waste	Gas to grid
65	2014	Enfield	UK	1000	Agricultural waste	Gas to grid
66	2014	Frogmary	UK	1000	Agricultural waste	Gas to grid
67	2014	Leeming	UK	1000	Agricultural waste	Gas to grid
68	2014	Vårgårda	Sweden	500	Agricultural waste	Vehicle Fuel (CNG)
69	2014	Jevnaker	Norway	400	Organic Waste	Vehicle Fuel (CNG)
70	2013	Son	Netherlands	1250	slaughterhouse waste	Gas to grid
71	2013	Andover	UK	2000	Agricultural waste	Gas to grid
72	2012	Poundbury	UK	650	Agricultural & Food Waste	Gas to grid
73	2012	Lelystad	Netherlands	100	Agricultural waste	Vehicle Fuel (CNG)
74	2011	Wijster	Netherlands	1500	Municipal Waste	Gas to grid
75	2009	Zwolle	Netherlands	520	Municipal Waste	Gas to grid
76	2009	Zalaergerszeg	Hungary	85	WWTP	CNG