Goals, Aims, and Scope

This manuscript aims to evaluate the technical feasibility, system performance, and mitigation potential of containerized oxy-combustion power modules with integrated CO_2 capture for decentralized valorization of associated petroleum gas (APG) in remote oilfields. The primary goals are to quantify energy and exergy performance of a modular 272 MW oxy-combustion + CCS unit, identify the main parasitic loads and optimization levers (ASU, CCS, gas sweetening, and CO2 recirculation), and assess operational flexibility by applying a multi-criteria selection of representative Ecuadorian Amazon production blocks.

The scope includes steady-state process simulations and mass-energy balances for APG conditioning, cryogenic air separation, oxy-combustion Brayton–Rankine integration, CO_2 compression/liquefaction, and DEA-based sweetening for selected blocks 57, 60, and 61. Performance metrics cover thermal and exergetic efficiencies, specific energy consumption for O_2 and CO_2 handling, capture rates, and modular scalability to global flaring volumes. The analysis omits detailed cost modeling, long-term field deployment logistics, and full life-cycle environmental assessments, while offering policy-relevant scaling scenarios and technical recommendations to support subsequent techno-economic and implementation studies.

Simulation Environment and Thermodynamic Models

All process simulations were conducted using Aspen HYSYS v12.1. Thermodynamic property packages were selected based on the fluid characteristics and operating conditions of each subsystem:

- Associated Petroleum Gas (APG) and Combustion Streams: Peng-Robinson (PR) equation of state was used for hydrocarbon-rich mixtures due to its robustness in predicting vapor-liquid equilibria and enthalpy across wide pressure and temperature ranges.
- DEA-based Acid Gas Sweetening: The Amine Package with Kent–Eisenberg model was applied to simulate CO_2 and H_2S absorption and regeneration, ensuring accurate representation of solvent loading and heat duties.
- Cryogenic Air Separation Unit (ASU): Soave–Redlich–Kwong (SRK) was used for air components (O_2, N_2, Ar) under cryogenic conditions, offering reliable phase behavior predictions at low temperatures.
- CO_2 Compression and Liquefaction: GERG-2008 model was selected for high-pressure CO_2 streams to capture non-ideal behavior and density variations critical for pipeline and storage design.

All simulations were performed under steady-state conditions with a reference temperature of 25 °C and pressure of 1 atm. Stream convergence tolerances were set to 1E-06 for mass and energy balances. Equipment efficiencies, pressure drops, and heat exchanger pinch points were calibrated using vendor data and validated against literature benchmarks.

Notation and Sign Convention

This supplementary material follows standardized engineering notation and thermodynamic sign conventions to ensure clarity and reproducibility across all process simulations and balance tables.

- **Units and Formatting**
    - Temperatures are reported in degrees Celsius (°C).
    - Pressures are expressed in kilopascals (kPa).
    - Molar flows are given in kmol/h; mass flows in kg/h.
    - Enthalpies and energy flows are reported in kJ/kmol and kJ/h, respectively.
    - Decimal points are denoted with periods (e.g., 32.41), and scientific notation is used for large or small values (e.g., 2.87E+04 kmol/h).

- **Sign Convention for Energy Flows**
    - Positive values indicate energy added to the system (e.g., heat input, compression work).
    - Negative values indicate energy removed from the system (e.g., heat rejection, expansion work).
    - All enthalpy and heat flow values are referenced to a standard base condition of 25 °C and 1 atm unless otherwise specified.

- **Stream Consistency**
    - For each stream, mass flow is computed as:
      Mass flow (kg/h)=Molar flow (kmol/h)×Molecular weigh t (kg/kmol)
    - Total energy flow is computed as:

Energy flow (kJ/h)=Molar flow (kmol/h)×Enthalpy (kJ/k mol)

Gas properties

Table S1 presents a comparative overview of the physicochemical composition and energy characteristics of associated gas samples from the three Ecuadorian oil blocks selected (57, 60, and 61).

Table S1 Energy properties of the inlet stream resulted from the multicriteria analysis.

Property	**Block 57**	**Block 60**	**Block 61**
Molecular Weight (kg/kmol)	33.014	34.241	26.880
Low Heating Value (Btu lbm)	19466	19369	19314
Compound (%mol)	**Block 57**	**Block 60**	**Block 61**
N_2	0.032	0.023	0.049
CH_4	0.383	0.297	0.562
CO_2	0.218	0.192	0.071
C_2H_6	0.065	0.101	0.073
H_2O	0.053	0.081	0.053
C_3H_8	0.114	0.168	0.100
iC_4H_{10}	0.032	0.032	0.025

nC_4H_{10}	0.062	0.071	0.038
iC_5H_{12}	0.026	0.021	0.014
nC_5H_{12}	0.012	0.011	0.008
nC_6H_{14}	0.003	0.002	0.006
nC_7H_{14}	0.000	0.001	0.001
Total	1.000	1.000	1.000

Gas sweetening

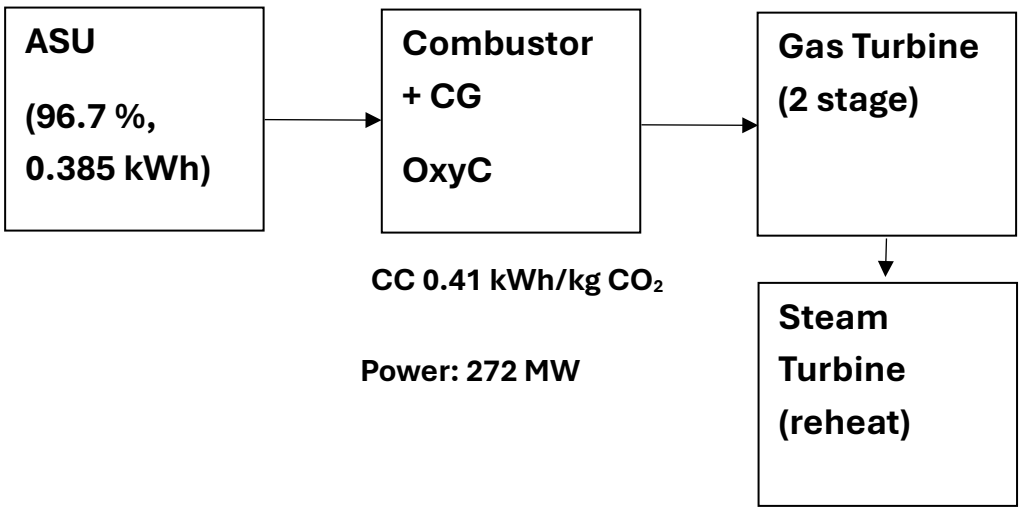
Mixer MIX-100

Table S2 Inlet for sweetening. Mixed stream composition

Compound	Yi inlet	Yi outlet
N_2	0.032	0.042
CO_2	0.185	0.017
CH_4	0.385	0.503
C_2H_6	0.078	0.102
C_3H_8	0.129	0.169
iC_4H_{10}	0.031	0.040
nC_4H_{10}	0.061	0.079
iC_5H_{12}	0.022	0.028
nC_5H_{12}	0.012	0.015
nC_6H_{14}	0.003	0.004
nC_7H_{14}	0.000	0.001
H_2O	0.060	0.001
H_2S	0.002	0.000
Total	1.000	1.000

Safety, materials, and downstream equipment compatibility drive limits: pipeline and gas-turbine manufacturers typically require H2S at single-digit ppm levels; corrosion and sulfide stress cracking risks proliferate at concentrations above these levels.

Sketch of the system



Multicriteria analysis

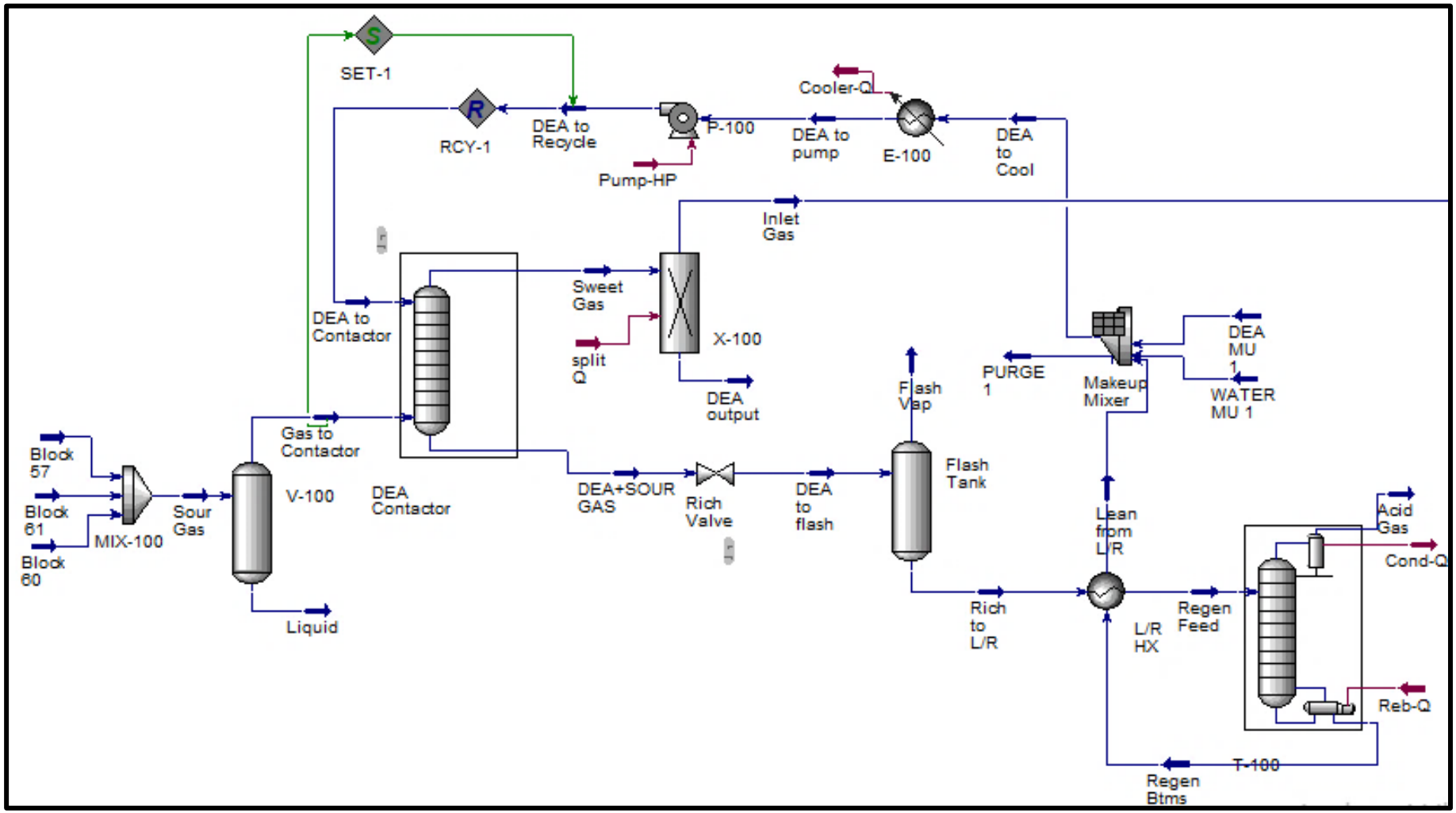
Table S3 Matrix of multicriteria evaluation

Criterion	Comp and quality	Heating value	Volume per day	Total score
Weight	0.40	0.30	0.30	10.00
Block 18	2.82	4.15	1.94	2.96
Block 12	4.35	0.00	1.29	2.13
Block 43	6.69	8.71	0.47	5.43
Block 56	5.50	7.73	0.10	4.55
Block 60	4.73	9.25	6.31	**6.56**
Block 61	6.71	8.83	3.19	**6.29**
Block 07	6.04	1.25	0.00	2.79
Block 15	5.42	7.06	0.97	4.58
Block 57	5.37	10.00	10.00	**8.15**

Table S3 Matrix of multicriteria evaluation. Criterion weights (Composition and quality: 0.40; Heating value: 0.30; Volume per day: 0.30) were obtained using the Analytic Hierarchy Process. Stakeholders comprising technical staff from the oil company and the university project team completed independent pairwise comparisons; individual judgments were aggregated via the geometric mean, and the group priority vector was calculated from the principal eigenvector. The aggregated comparison matrix had a consistency ratio of 0.07. Block scores are the weighted sum of normalized criterion scores.

Details of pairwise comparison data at the end of Supplementary Material—Appendix 1

Mass and energy balance Plot 1



Sweetening Unit

Mixer MIX-100

Table S4 Mixer Fluid Inlet and Outlet Conditions (MIX-100)

Stream	**Inputs**			**Output**
Temperature (°C)	32.22	32.22	32.22	29.64
Pressure (kPa)	6800	6800	6800	6800
Molar Flow (kmol/h)	1456.44	931.26	488.52	2876.22
Enthalpy (kJ/kmol)	-1.70E+05	1.72E+05	-1.17E+05	-1.62E+05
Molecular Weight	33.05	34.29	26.92	32.41

L/R HX heat exchanger.

Table S5 Conditions of inlet and outlet of fluids from the L/R HX exchanger.

Stream	**Inputs**		**Output**	
Temperature (°C)	72.61	126.24	95.00	99.68
Pressure (kPa)	621	220	552	151
Enthalpy (kJ/kmol)	-3.07E+05	-2.94E+05	-3.05E+05	-2.97E+05
Molar flow (kmol/h)	2.49E+05	2.27E+05	2.49E+05	2.27E+05
Molecular Weight	26.35	25.43	26.35	25.43

Separator V-100

Table S6: Separator Inlet and Outlet Conditions (V-100)

Stream	**Inputs**		**Output**	
Temperature (°C)	72.61	126.24	95.00	99.68
Pressure (kPa)	621	220	552	151
Enthalpy (kJ/kmol)	-3.07E+05	-2.94E+05	-3.05E+05	-2.97E+05
Molar flow (kmol/h)	2.49E+05	2.27E+05	2.49E+05	2.27E+05
Heat Flow (kJ/h)	-2.90E+09	-2.63E+09	-2876416109	-2.65E+09
Molecular Weight	26.35	25.43	26.35	25.43

DEA Absorption Tower Contactor

Table S7 Input and Output Conditions of the Mass and Energy Balance of the DEA Contactor Absorption Tower

Stream	**Inputs**		**Outputs**	
Temperature (°C)	35.86	29.63	41.10	73.29
Pressure (kPa)	6765	6800	6745	6800
Molar flow (kmol/h)	8.97E+06	2.70E+06	2.57E+06	8.08E+06
Heat Flow (kJ/h)	-2.71E+09	-4.14E+08	-2.14E+08	-2.91E+09
Enthalpy (kJ/kmol)	-3.02E+08	-1.53E+08	-9.73E+07	-3.07E+08
Molecular Weight	25.41	33.35	26.39	30.95

Splitter Flash Tank

Table S8 Fluid outlet and inlet conditions from the Flash Tank separator.

Stream	**Input**	**Output**	
Temperature (°C)	72.60	72.60	72.60
Pressure (kPa)	620	620	620
Molar flow (kmol/h)	9.47E+06	9.45E+06	3.47E+04
Enthalpy (kJ/kmol)	-3.07E+08	-3.07E+08	-2.98E+08
Molecular Weight	26.39	26.34	37.71

Make up-Mixer

Table S9 Mixer Operating Conditions (Make-up-Mixer)

Stream	**Inputs**			**Outputs**	
Temperature (°C)	99.68	99.68	99.68	99.68	99.68
Pressure (kPa)	151	151	151	151	151
Molar flow (kmol/h)	8.93E+03	2.77E+01	0	8.93E+03	2.85E-03
Enthalpy (kJ/kmol)	-2.97E+05	-2.80E+05	-4.64E+05	-2.96E+05	-4.64E+05

Molecular Weight	25.43	18.02	105.14	25.41	105.14

Cooler E-100

Table S10 Operating Conditions

Stream	**Input**	**Output**
Temperature (°C)	99.67	35.00
Pressure (kPa)	150	115
Mass flow (kg/h)	2.28E+08	2.28E+08
Enthalpy (kJ/kmol)	-2.96E+08	-3.03E+08
Heat Flow (kJ/h)	0	5.48E+07

Pump P-100

Table S11 Pump Operating Conditions

Stream	**Input**	**Output**
Temperature (°C)	35.00	35.86
Pressure (kPa)	115	6765
Mass flow (kg/h)	2.49E+08	2.28E+08
Energy (kJ/h)	1.95E+06	0
Enthalpy (kJ/kmol)	-3.03E+08	-3.02E+08

T-100 Amine Regenerator

Table S12 Operating Conditions of T-100 Amine Regenerator

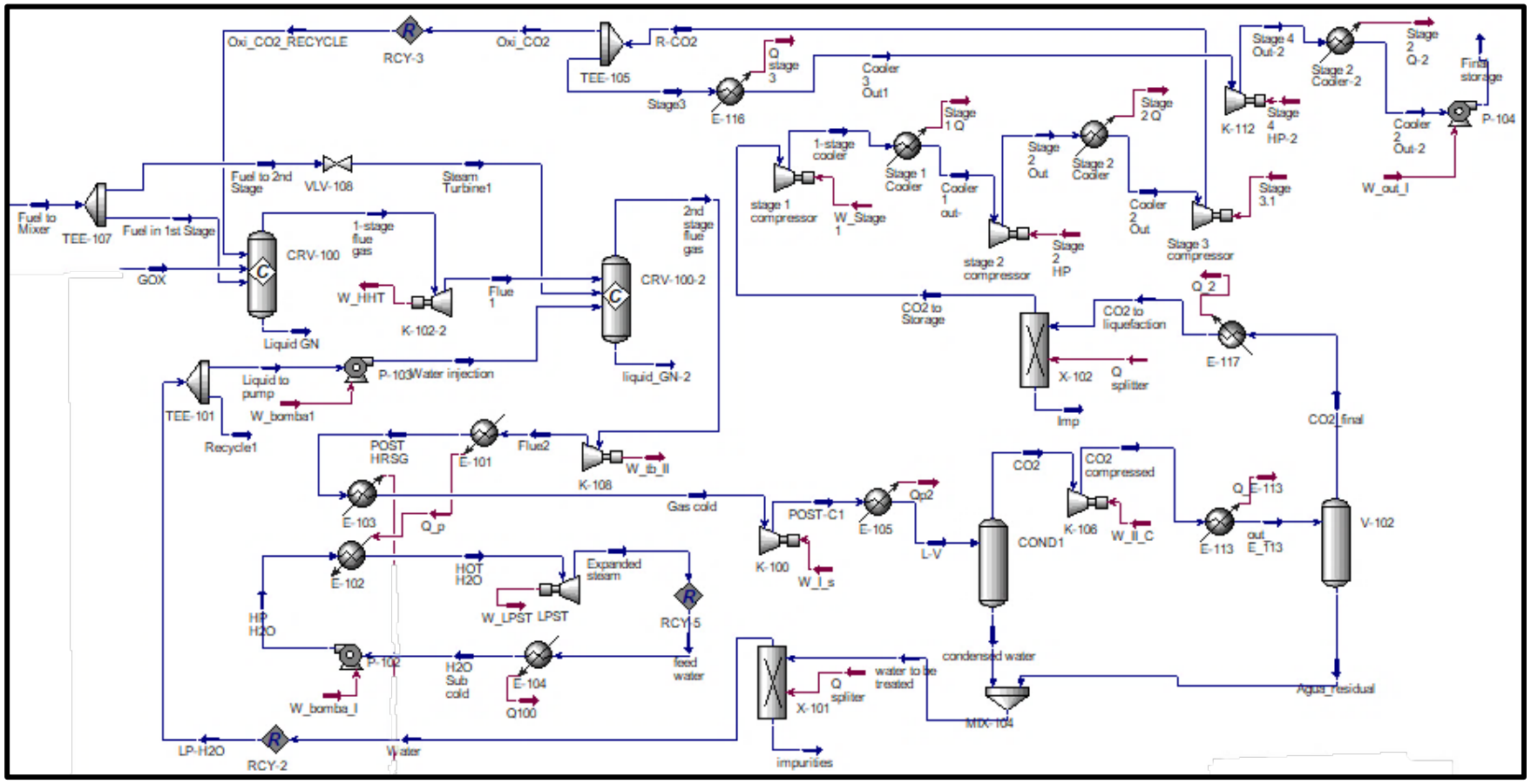
Stream	**Inputs**		**Output**
Temperature (°C)	95.06	126.23	44.99
Pressure (kPa)	551	219	189
Mass flow (kg/h)	2.49E+08	2.27E+08	2.13E+07
Energy (kJ/h)	7.13E+07		
Enthalpy (kJ/kmol)	-3.05E+08	-2.94E+08	-3.84E+08

Splitter TEE-107

Table S13 Mass and energy balance of the splitter.

Stream	**Input**	**Output**	
Temperature (°C)	36.37	36.37	36.37
Pressure (kPa)	4500	4500	4500
Molar Flow (kmol/h)	2194	1316	877.4
Molecular Weight	31.00	31.00	31.00
Enthalpy (kJ/kmol)	-9.82E+04	-9.82E+04	-9.82E+04

Mass and energy balance Plot 2



Conversion Reactor (CRV-100)

Table S14 Mass and energy balance of the conversion reactor.

Stream	**Input**		**Output**
Temperature (°C)	36.370	1399	1399
Pressure (kPa)	4500	4500	4500
Molar Flow (kmol/h)	1316.15	2.86E+04	2.86E+04
Enthalpy (kJ/kmol)	-9.82E+04	-2.62E+05	-2.62E+05

Table S15: Calculation of stoichiometric moles of O2 for oxycombustion in the combustion chamber

Component	**Fuel (kmol/h)**	**Ratio**[1]	**St O_2 (kmol/h)**
Methane	661.40	2	1322.79
Ethane	133.70	3.5	467.95
Propane	221.92	5	1109.61
i- butane	53.30	6.5	346.46
N-butane	103.54	6.5	673.00
i-pentane	37.023	8	296.21
N-pentane	19.30	8	154.43
Hexane+	5.59	9.5	53.06
Heptane+	0.860	11	9.46

Calculation of moles of carbon dioxide and water obtained during the combustion of the first reactor

$$\frac{1\ kmol\ CH_4}{h} \times \frac{1\ mol\ CO_2}{1\ mol\ CH_4} = 1\ kmol\ \ CO_2/h$$

$$\frac{1\ kmol\ CH_4}{h} \times \frac{2\ mol\ H_2O}{1\ mol\ CH_4} = 2\ kmol\ H_2O/h$$

$$C_{3.50}H_{5.75} + 3.50O_2 \rightarrow 3.50CO_2 + 2.87H_2O$$

[1] Relation **$kmol_{O2}$ to $kmol_{fuel}$**

$$1\ kmol\ C_{3.50}H_{5.75} \times \frac{3.5\ kmol\ CO_2}{1\ kmol\ C_{3.50}H_{5.75}} = 3.5\ kmol\ CO_2$$

$$1\ kmol\ C_{3.50}H_{5.75} \times \frac{2.87\ kmol\ H_2O}{1\ kmol\ C_{3.50}H_{5.75}} = 2.87\ kmol\ H_2O$$

Table S16: Calculation of the moles of carbon dioxide and water formed

Component	**Inlet (kmol/h)**	**Cons or prod**	**Output (kmol/h)**
Nitrogen	55.32	0.00	55.32
Carbon dioxide	1.90E+04	2543.11	2.16E+04
Methane	661.40	661.40	0.00
Ethane	133.70	133.70	0.00
Propane	221.92	221.92	0.00
i- butane	53.30	53.30	0.00
N-butane	103.54	103.54	0.00
i-pentane	37.03	37.03	0.00
N-pentane	19.30	19.30	0.00
Hexane+	5.59	5.59	0.00
Heptane+	0.86	0.86	0.00
Water	1.61	3779.85	3781.46

Table S17: Conversion Reactor (CRV-100-2)

Variable	**Input**		**Output**
Temperature (°C)	1009	91.76	1399
Pressure (kPa)	632.5	632.5	632.5
Molar Flow (kmol/h)	2.87E+04	4844	3.48E+04
Molecular Weight	39.37	18.02	35.63
Molar Enthalpy (kJ/kmol)	-2.84E+05	-2.81E+05	-2.75E+05

Table S18: Calculation of stoichiometric O_2 moles for oxycombustion in the combustion chamber

Component	**Fuel (kmol/h)**	**kmol$_{O2}$ / kmol$_{fuel}$**	**St O_2 (kmol/h)**
Methane	440.93	2.00	881.86
Ethane	89.13	3.50	311.97
Propane	147.95	5.00	739.74
i- butane	35.53	6.50	230.98
N-butane	69.03	6.50	448.67
i-pentane	24.68	8.00	197.47
N-pentane	12.87	8.00	102.95
Hexane+	3.72	9.50	35.37
Heptane+	0.57	11.00	6.31

Calculation of moles of carbon dioxide and water obtained during the combustion of the second reactor.

$$\frac{1\ kmol\ CH_4}{h} \times \frac{1\ mol\ CO_2}{1\ mol\ CH_4} = 1\ kmol\ \ CO_2/h$$

$$\frac{1\ kmol\ CH_4}{h} \times \frac{2\ mol\ H_2O}{1\ mol\ CH_4} = 2\ kmol\ H_2O$$

$$C_{3.50}H_{5.75} + 3.50O_2 \rightarrow 3.50CO_2 + 2.87H_2O$$

$$1\ kmol\ C_{3.50}H_{5.75} \times \frac{3.5\ kmol\ CO_2}{1\ kmol\ C_{3.50}H_{5.75}} = 3.5\ kmol\ CO_2$$

$$1\ kmol\ C_{3.50}H_{5.75} \times \frac{2.87\ kmol\ H_2O}{1\ kmol\ C_{3.50}H_{5.75}} = 2.87\ kmol\ H_2O$$

Table S19: Calculation of the moles of carbon dioxide and water formed

Component	**Inlet (kmol/h)**	**Cons or prod**	**Output (kmol/h)**
Nitrogen	92.20	0	92.20
Carbon dioxide	21620.73	1695.40	23316.14
Methane	440.93	440.93	0
Ethane	89.13	89.13	0
Propane	147.95	147.95	0
i- butane	35.53	35.53	0
N-butane	69.03	69.03	0
i-pentane	24.68	24.68	0
N-pentane	12.87	12.87	0
Hexane+	3.72	3.72	0
Heptane+	0.57	0.57	0
Water	3782.53	7364.23	11146.77

Energy equation

An injection of water vapor from the outlet of the deaerator between (58.30 – 62) % must be carried out to control the exhaust temperature of the gases below 1400 °C in the second reactor.

$$Relacion_{CO_2/fuel} = \frac{4844.33\ kmol\ H_2O}{877.44\ kmol\ C_{3.50}H_{5.75}} = \frac{5.52\ kmol\ H_2O}{kmol\ C_{3.50}H_{5.75}}$$

Turbine (K-102-2)

Table S20: Energy balance parameters in the expansion

Stream	**Input**	**Output**
Temperature (°C)	1399.0	1009.0

Pressure (kPa)	4500	632.5
Molar Flow (kmol/h)	2.87E+04	2.87E+04
Molecular Weight	39.37	39.37
Enthalpy (kJ/kmol)	-2.62E+05	-2.84E+05
Energy (kJ/h)	-7.51E+9	6.11E+8

Splitter (TEE-101)

Table S21: Energy balance parameters in the splitter

Stream	**Input**	**Output**	
Temperature (°C)	91.72	91.72	91.72
Pressure (kPa)	122	122	122
Molar Flow (kmol/h)	8309	3465	4844
Molecular Weight	18.05	18.01	18.02
Enthalpy (kJ/kmol)	-2.81E+05	-2.81E+05	-2.81E+05

Table S22: Heat Recovery Steam Generator (E-101)

Stream	**Input**	**Output**
Temperature (°C)	1029	380.3
Pressure (kPa)	100	95
Molar Flow (kmol/h)	3.48E+04	3.48E+04
Molecular Weight	35.63	35.63
Enthalpy (kJ/kmol)	-2.95E+05	-3.27E+05
Energy (kJ/h)	-	1.11E+9

Pump (P-103)

Table S23: Energy balance parameters in the pump

Stream	**Input**	**Output**
Temperature (°C)	91.72	91.76
Pressure (kPa)	122	632.5
Molar Flow (kmol/h)	4844	4844
Molecular Weight	18.02	18.02
Enthalpy (kJ/kmol)	-2.81E+05	-2.81E+05
Energy Flow (kJ/h)	5.18E+04	-

Heat Exchanger (E-103)

Table S24: Energy balance parameters in the heat exchanger

Stream	**Input**	**Output**
Temperature (°C)	380.3	319.3
Pressure (kPa)	95	90
Molar Flow (kmol/h)	3.48E+04	3.48E+04
Molecular Weight	35.63	35.63
Enthalpy (kJ/kmol)	-3.27E+05	-3.30E+05
Heat Flow (kJ/h)	-	9.24E+7

Pump (P-102)

Table S25: Energy balance parameters in the pump

Stream	**Input**	**Output**
Temperature (°C)	15	15.5
Pressure (kPa)	2.000	1.00E+04
Molar Flow (kmol/h)	1.80E+04	1.80E+04

Molecular Weight	18.00	18.00
Enthalpy (kJ/kmol)	-2.87E+05	-2.87E+05
Energy (kJ/h)	3.76E+06	-

Turbine (LPST)

Table S26: Energy balance parameters in the turbine

Stream	**Input**	**Output**
Temperature (°C)	540	17.86
Pressure (kPa)	9995	2.000
Molar Flow (kmol/h)	1.80E+04	1.80E+04
Molecular Weight	18.00	18.00
Enthalpy (kJ/kmol)	-2.25E+05	-2.50E+05
Energy (kJ/h)	-	4.42E+8

Compresor (K-100)

Table S27: Energy balance parameters in the compressor

Stream	**Input**	**Output**
Temperature (°C)	319.3	373.2
Pressure (kPa)	90	127
Molar Flow (kmol/h)	3.48E+04	3.48E+04
Molecular Weight	35.63	35.63
Enthalpy (kJ/kmol)	-3.30E+05	-3.27E+05
Energy (kJ/h)	8.14E+7	-

Cooler (E-105)

Table S28: Energy balance parameters in the cooler

Stream	**Input**	**Output**
Temperature (°C)	373.2	60
Pressure (kPa)	127	122
Molar Flow (kmol/h	3.48E+04	3.48E+04
Molecular Weight	35.63	35.63
Enthalpy (kJ/kmol)	-3.27E+05	-3.48E+05
Heat Flow (kJ/h)	-	7.24E+08

Splitter (COND1)

Table S29: Energy balance parameters in the splitter

Variable	**Input**	**Output**	
Temperature (°C)	60	60	60
Pressure (kPa)	122	122	122
Molar Flow (kmol/h)	3.48E+07	6492	2.83E+07
Molecular Weight	35.63	18.02	39.58
Enthalpy (kJ/kmol)	-3.48E+08	-2.84E+08	-3.63E+08

Compressor (K-106)

Table S30: Energy balance parameters in the compressor

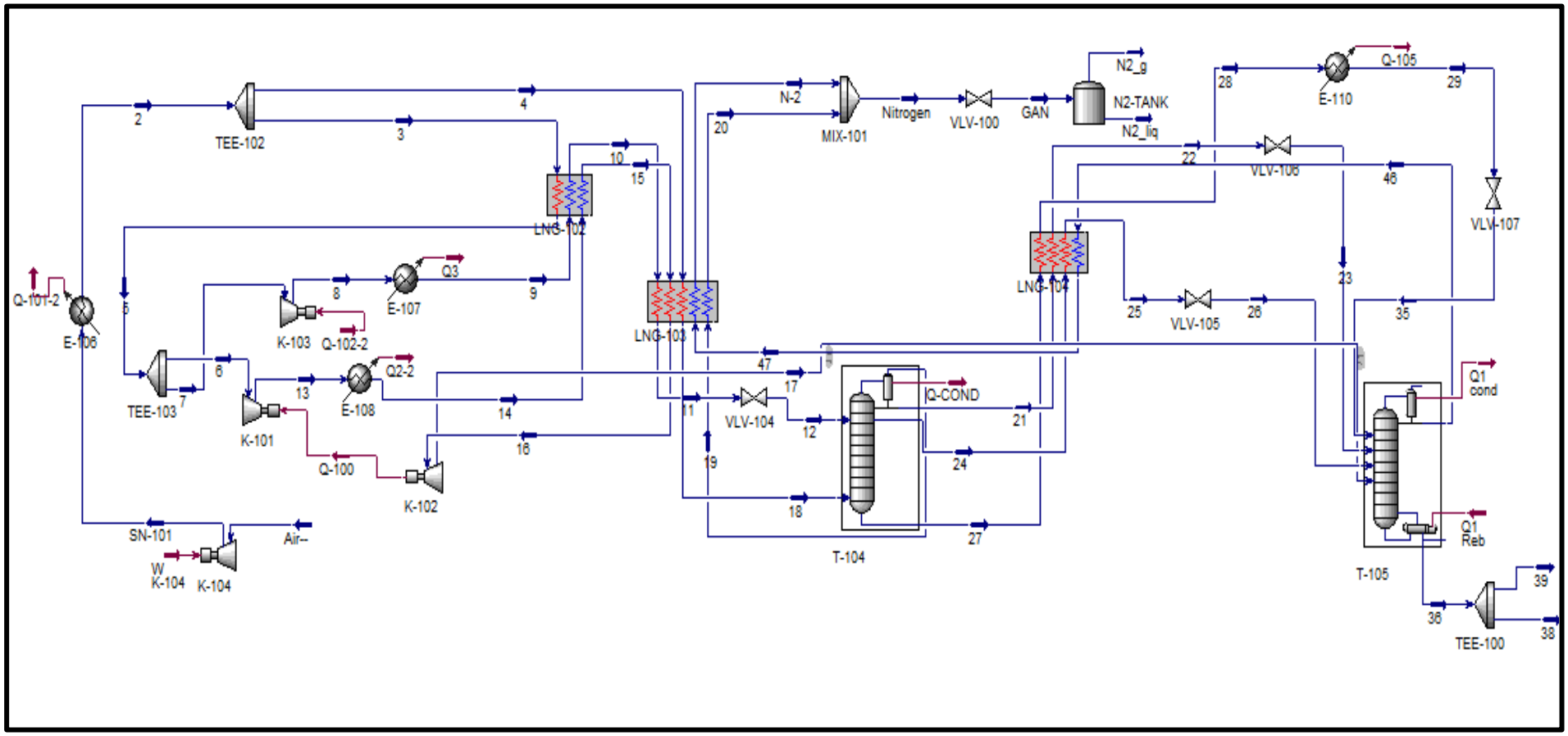
Stream	**Input**	**Output**
Temperature (°C)	60	107
Pressure (kPa)	122	195
Molar Flow (kmol/h)	2.83E+04	2.83E+04
Molecular Weight	39.58	39.58
Enthalpy (kJ/kmol)	-3.63E+05	-3.61E+05
Energy (kJ/h)	5.13E+7	-

Cooler (E-113)

Table S31: Energy balance parameters in the cooler

Stream	**Input**	**Output**
Temperature (°C)	107	60
Pressure (kPa)	195	190
Molar Flow (kmol/h)	2.83E+04	2.83E+04
Molecular Weight	39.58	39.58
Enthalpy (kJ/kmol)	-3.61E+05	-3.66E+05
Energy (kJ/h)	-	1.31E+8

Mass and energy balance Plot 3



Splitter V-102

Table S32: Energy balance parameters in the splitter

Stream	**Input**	**Output**	
Temperature (°C)	60	60	60
Pressure (kPa)	190	190	190
Molar Flow (kmol/h)	2.83E+04	1840	2.65E+04
Molecular Weight	39.58	18.04	39.58
Enthalpy (kJ/kmol)	-3.66E+05	-2.84E+05	-3.71E+05

CO2 Liquefaction and Storage System

Table S33: Compressor (stage 1 compressor)

Stream	Input	Output
Temperature (°C)	50	142
Pressure (kPa)	185	555
Molar Flow (kmol/h	2.33E+04	2.33E+04
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-3.93E+05	-3.89E+05
Energy (kJ/h)	8.52E+07	-

Table S34: Cooler (Stage 1 Cooler)

Stream	Input	Output
Temperature (°C)	142	94
Pressure (kPa)	555	520
Molar Flow (kmol/h	2.33E+04	2.33E+04
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-3.89E+05	-3.91E+05
Heat Flow (kJ/h)	-	4.65E+07

Table S35: Compressor (stage 2 compressor)

Stream	Input	Output
Temperature (°C)	94	195.5
Pressure (kPa)	520	1560
Molar Flow (kmol/h	2.33E+04	2.33E+04
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-3.91E+05	-3.87E+05
Energy (kJ/h)	9.59E+07	-

Table S36: Cooler (Stage 2 Cooler)

Stream	**Input**	**Output**
Temperature (°C)	195.5	94
Pressure (kPa)	1560	1525
Molar Flow (kmol/h)	2.33E+04	2.33E+04
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-3.87E+05	-3.92E+05
Energy (kJ/h)	-	1.03E+08

Table S37: Compressor (Stage 3 compressor)

Stream	**Input**	**Output**
Temperature (°C)	94	196.9
Pressure (kPa)	1525	4500
Molar Flow (kmol/h	2.33E+04	2.33E+04
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-3.92E+05	-3.88E+05
Energy (kJ/h)	9.17E+07	-

Table S38: Cooler (E-116)

Stream	**Input**	**Output**
Temperature (°C)	196.9	94
Pressure (kPa)	4500	4465
Molar Flow (kmol/h)	4430	4430
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-3.88E+05	-3.93E+05
Energy (kJ/h)	-	2.16E+07

Table S39: Compressor (K-112)

Stream	**Input**	**Output**
Temperature (°C)	94	204.1
Pressure (kPa)	4465	1.34E+04
Molar Flow (kmol/h	4430	4430
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-3.93E+05	-3.89E+05
Energy (kJ/h)	1.65E+07	-1.72E+07

Table S40: Cooler (Stage 2 Cooler-2)

Stream	**Input**	**Output**
Temperature (°C)	204.1	25
Pressure (kPa)	1.34E+04	1.34E+04
Molar Flow (kmol/h	4430	4430
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-3.89E+08	-4.05E+08
Energy (kJ/h)	-	7.24E+10

Table S41: Pump (P-104)

Stream	**Input**	**Output**
Temperature (°C)	25	33.22
Pressure (kPa)	1.34E+04	2.00E+04
Molar Flow (kmol/h	4430	4430
Molecular Weight	44.21	44.21
Enthalpy (kJ/kmol)	-4.05E+05	-4.05E+05
Energy (kJ/h)	1.81E+06	-

Cryogenic Air Distillation

Table S42: Compressor (K-104)

Stream	**Input**	**Output**
Temperature (°C)	28.79	238.4
Pressure (kPa)	101.3	555
Molar Flow (kmol/h	3.56E+04	3.56E+04
Molecular Weight	28.93	28.93
Enthalpy (kJ/kmol)	102.2	6333
Energy (kJ/h)	2.22E+08	-

Table S43: Cooler (E-106)

Stream	**Input**	**Output**
Temperature (°C)	238.4	17.09
Pressure (kPa)	555	550
Molar Flow (kmol/h)	3.56E+04	3.56E+04
Molecular Weight	28.93	28.93
Enthalpy (kJ/kmol)	6333	-276.5
Energy (kJ/h)	-	2.35E+08

Table S44: Current Separator (Tee-102)

Stream	**Input**	**Output**	
Temperature (°C)	17.09	17.09	17.09
Pressure (kPa)	550	550	550
Molar Flow (kmol/h	3.56E+04	1.95E+04	1.61E+04
Molecular Weight	28.93	28.92	28.94
Enthalpy (kJ/kmol)	-276.5	-276.5	-276.5

Table S45: Booster Heat Exchanger (LNG-102)

Stream	**Input**			**Output**		
Temperature (°C)	17.09	30.57	30	24	23.87	23.87
Pressure (kPa)	550	6395	732.7	543	6390	730
Molar Flow (kmol/h	1.61E+04	1.03E+04	5.82E+03	1.61E+04	1.03E+04	5819
Molecular Weight	28.94	28.83	29.04	28.94	28.83	29.04
Enthalpy (kJ/kmol)	-276.5	-291.2	88.47	-73.11	-507.5	-91.96
Heat Flow (kJ/h)	-4.45E+06	-2.99E+06	5.15E+05	-1.18E+06	-5.21E+06	-5.35E+06

Table S46: Current Mixer (Tee-103)

Stream	**Input**	**Output**	
Temperature (°C)	24	24	24
Pressure (kPa)	543	543	543
Molar Flow (kmol/h	1.61E+04	1.03E+04	5819
Molecular Weight	28.94	28.83	29.04
Enthalpy (kJ/kmol)	-73.11	-73.11	-73.11

Table S47: Compressor (K-101)

Stream	**Input**	**Output**
Temperature (°C)	24	54.24
Pressure (kPa)	543	737.7
Molar Flow (kmol/h	5819	5819
Molecular Weight	29.04	29.04
Enthalpy (kJ/kmol)	-73.11	803.8
Energy (kJ/h)	5.10E+06	-

Table S48: Cooler (E-108)

Stream	**Input**	**Output**
Temperature (°C)	54.24	30
Pressure (kPa)	737.7	732.7
Molar Flow (kmol/h)	5819	5819
Molecular Weight	29.04	29.04
Enthalpy (kJ/kmol)	803.8	88.47
Energy (kJ/h)	-	4.16E+06

Table S49: Compressor Booster (K-103)

Stream	**Input**	**Output**
Temperature (°C)	24	369
Pressure (kPa)	543	6400
Molar Flow (kmol/h)	1.03E+04	1.03E+04
Molecular Weight	28.83	28.83
Enthalpy (kJ/kmol)	-73.11	1.04E+04
Heat Flow (kJ/h)	1,07E+05	-

Table S50: Main Heat Exchanger (LNG-103)

Stream	**Input**					**Output**				
Temperature (°C)	23.87	23.87	17.09	-193.5	-177	-173.7	-136.1	-170.8	-56.16	16.55
Pressure (kPa)	6390	730	550	130	535	6370	727	539	122	527
Molar Flow (kmol/h)	1.03E+04	5819	1.95E+04	2.78E+04	37.95	1.03E+04	5819	1.95E+04	2.78E+04	37.95
Molecular Weight	28.83	29.04	28.92	28.06	28.27	28.83	29.04	28.92	28.06	28.27
Enthalpy (kJ/kmol)	-507.5	-91.96	-276.5	-1.11E+04	-6045	-1.09E+04	-4821	-5828	-2362	-289.1
Heat Flow (kJ/h)	-5.21E+06	-5.35E+05	-5.38E+06	-3.08E+08	-2.29E+05	-1.12E+08	-2.81E+07	-1.14E+07	-6.57E+07	-1.10E+04

Table S51: Cooling (E-107)

Stream	**Input**	**Output**
Temperature (°C)	369	30.57
Pressure (kPa)	6400	6395
Molar Flow (kmol/h)	1.02E+04	1.02E+04
Molecular Weight	29.12	29.12
Molar Enthalpy (kJ/kmol)	1.03E+04	-291.2
Heat Flow (kJ/h)	-	1.09E+07

Table S52: High Pressure Column (T-104)

Stream	**Input**			**Output**		
Temperature (°C)	-176	-170.8	-177	-177	-175.1	-173.5
Pressure (kPa)	538.7	539	535	535	541.9	549
Molar Flow (kmol/h)	1.03E+04	1.95E+04	37.95	1.92E+04	4011	6533
Molecular Weight	28.83	28.92	28.27	28.54	29.42	29.85
Enthalpy (kJ/kmol)	-1.09E+04	-5828	-6045	-1.11E+04	-1.12E+04	-1.13E+04

Stream	**Input**				**Output**			
Temperature (°C)	-173.5	-177	-175.1	-193.3	-180.9	-192	-180.8	-193.5
Pressure (kPa)	549	535	541.9	133	534	530	534	130
Molar Flow (kmol/h)	6.53E+03	1.92E+04	4.01E+03	2.78E+04	6.53E+03	1.92E+04	4011	2.78E+04
Molecular Weight	29.85	28.54	29.42	28.06	29.85	28.54	29.42	28.06
Enthalpy (kJ/kmol)	-1.13E+04	-1.11E+04	-1.12E+04	-1.18E+04	-1.17E+04	-1.19E+04	-1.15E+04	-1.11E+04
Heat Flow (kJ/h)	-7.36E+07	-2.12E+08	-4.48E+07	-3.29E+08	-7.64E+07	-2.28E+08	-4.62E+07	-3.08E+08

Heat Exchanger (LNG-104)

Low-Pressure Column (T-105)

Stream	**Input**				**Output**	
Temperature (°C)	-192.4	-190.8	-189.6	-171.4	-193.3	-179.9
Pressure (kPa)	133	134.9	136	248.7	133	140
Molar Flow (kmol/h	1.92E+04	4011	6533	5819	2.78E+04	7688
Molecular Weight	28.54	29.42	29.85	29.04	28.06	32.26
Enthalpy (kJ/kmol)	-1.19E+04	-1.15E+04	-1.19E+04	-5698	-1.18E+04	-1.25E+04

Pairwise comparison and AHP results

AHP Analytic Hierarchy Process (EVM multiple inputs)

K. D. Goepel Version **15.09.2018** Free web based AHP software on: http://bpmsg.com

Only input data in the light green fields and worksheets!

n=	9	Number of criteria (2 to 10)	Scale: 1	AHP 1-9
N=	4	Number of Participants (1 to 20)	α: 0,1	Consensus: 98,9%
p=	0	selected Participant (0=consol.)	2 7	Consolidated

Objective Evaluation of Associated Gas Potential Using Multi-Criteria Analysis (MCA)

Author G CHIRIBOGA

Date

Thresh: 1E-08 Iterations: 6 EVM check: 1,7E-09

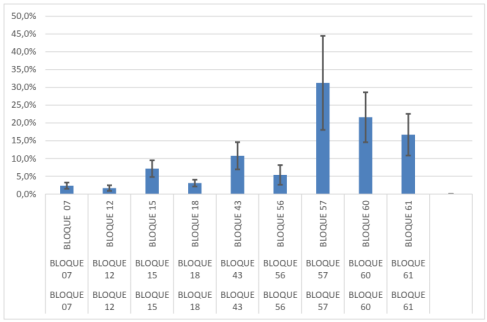
Table

	Criterion	Comment	Weights	+/-
1	BLOQUE 07		2,4%	0,9%
2	BLOQUE 12		1,7%	0,8%
3	BLOQUE 15		7,1%	2,3%
4	BLOQUE 18		3,1%	1,0%
5	BLOQUE 43		10,8%	3,8%
6	BLOQUE 56		5,4%	2,8%
7	BLOQUE 57		31,3%	13,2%
8	BLOQUE 60		21,6%	7,0%
9	BLOQUE 61	for 9&10 unprotect the input sheets and expand the question section ("+" in row 66)	16,7%	5,9%
#			0,00%	0,00%

Result

Eigenvalue Lambda: 9,620 MRE: 38,9%

Consistency Ratio 0,37 GCI: 0,19 Psi: ##### CR: 5,4%



Matrix

	BLOQUE 07 (1)	BLOQUE 12 (2)	BLOQUE 15 (3)	BLOQUE 18 (4)	BLOQUE 43 (5)	BLOQUE 56 (6)	BLOQUE 57 (7)	BLOQUE 60 (8)	BLOQUE 61 (9)	0 (10)	normalized principal Eigenvector
BLOQUE 07 (1)	1	2	1/4	1/2	1/5	1/4	1/8	1/6	1/6	-	2,36%
BLOQUE 12 (2)	1/2	1	1/5	3/8	1/7	1/6	1/9	1/8	1/7	-	1,68%
BLOQUE 15 (3)	4 2/7	5 1/3	1	2 5/8	5/7	2 1/5	1/5	1/5	2/7	-	7,15%
BLOQUE 18 (4)	1 6/7	2 5/7	3/8	1	2/9	1/3	1/7	1/7	1/5	-	3,09%
BLOQUE 43 (5)	5 1/3	7	1 2/5	4 3/5	1	3 5/6	1/4	3/8	4/9	-	10,77%
BLOQUE 56 (6)	3 5/6	5 4/7	4/9	3 1/3	1/4	1	1/7	1/5	1/5	-	5,39%
BLOQUE 57 (7)	8	8 3/4	5 1/6	7	4	7	1	1 2/3	3 2/3	-	31,26%
BLOQUE 60 (8)	6	8 1/2	5 1/6	6 5/7	2 5/8	5 1/2	3/5	1	1 2/5	-	21,60%
BLOQUE 61 (9)	6 4/9	7 4/9	3 4/7	5 1/7	2 1/5	5	2/7	5/7	1	-	16,70%
0 (10)	-	-	-	-	-	-	-	-	-	1	0,00%

AHP Analytic Hierarchy Process

n= 9 Input 1

Objective: Evaluation of Associated Gas Potential Using Multi-Criteria Analysis (MCA)

Only input data in the light green fields!

Please compare the importance of the elements in relation to the objective and fill in the table: Which element of each pair is more important, **A or B**, and **how much** more on a scale 1-9 as given below.
Once completed, you might adjust highlighted comparisons 1 to 3 to improve consistency.

n	Criteria	Comment	RGMM	+/-
1	BLOQUE 07		2,5%	0,7%
2	BLOQUE 12		1,8%	0,7%
3	BLOQUE 15		7,4%	2,1%
4	BLOQUE 18		3,5%	1,0%
5	BLOQUE 43		10,7%	3,0%
6	BLOQUE 56		5,0%	1,4%
7	BLOQUE 57		31,4%	11,3%
8	BLOQUE 60		22,2%	6,6%
9	BLOQUE 61	for 9&10 unprotect the input sheets and expand the	15,5%	
10		question section ("+" in row 66)		4,3%

Participant 1 | 1 | Name | Weight | Date

α: 0,1 CR: 4% Consistency Ratio

1

i	j	Criteria A	Criteria B	more important ? A or B	Scale (1-9)
1	2	BLOQUE 07	BLOQUE 12	A	2
1	3		BLOQUE 15	B	4
1	4		BLOQUE 18	B	2
1	5		BLOQUE 43	B	5
1	6		BLOQUE 56	B	3
1	7		BLOQUE 57	B	8
1	8		BLOQUE 60	B	7
2	3	BLOQUE 12	BLOQUE 15	B	5
2	4		BLOQUE 18	B	3
2	5		BLOQUE 43	B	6
2	6		BLOQUE 56	B	4
2	7		BLOQUE 57	B	9
2	8		BLOQUE 60	B	8
3	4	BLOQUE 15	BLOQUE 18	A	3
3	5		BLOQUE 43	B	2
3	6		BLOQUE 56	A	2
3	7		BLOQUE 57	B	5
3	8		BLOQUE 60	B	4
4	5	BLOQUE 18	BLOQUE 43	B	4
4	6		BLOQUE 56	B	2
4	7		BLOQUE 57	B	7
4	8		BLOQUE 60	B	6
5	6	BLOQUE 43	BLOQUE 56	A	3
5	7		BLOQUE 57	B	4
5	8		BLOQUE 60	B	3
6	7	BLOQUE 56	BLOQUE 57	B	6
6	8		BLOQUE 60	B	5
7	8	BLOQUE 57	BLOQUE 60	A	2
1	9	BLOQUE 07	BLOQUE 61	B	6
1	10				
2	9	BLOQUE 12	BLOQUE 61	B	7
2	10				
3	9	BLOQUE 15	BLOQUE 61	B	3
3	10				
4	9	BLOQUE 18	BLOQUE 61	B	5
4	10				
5	9	BLOQUE 43	BLOQUE 61	B	2
5	10				
6	9	BLOQUE 56	BLOQUE 61	B	4
6	10				
7	9	BLOQUE 57	BLOQUE 61	A	3
7	10				
8	9	BLOQUE 60	BLOQUE 61	A	2
8	10				
9	10				

A
B

Intensity	Definition	Explanation
1	Equal importance	Two elements contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one element over another
5	Strong Importance	Experience and judgment strongly favor one element over another
7	Very strong importance	One element is favored very strongly over another, it dominance is demonstrated in practice
9	Extreme importance	The evidence favoring one element over another is of the highest possible order of affirmation
2,4,6,8 can be used to express intermediate values		

AHPcalc-2018-09-15-In1

AHP Analytic Hierarchy Process

n= 9 Input 2

Objective: Evaluation of Associated Gas Potential Using Multi-Criteria Analysis (MCA)

Only input data in the light green fields!

Please compare the importance of the elements in relation to the objective and fill in the table: Which element of each pair is more important, **A or B**, and **how much** more on a scale 1-9 as given below.

Once completed, you might adjust highlighted comparisons 1 to 3 to improve consistency.

n	Criteria	Comment	RGMM	+/-
1	BLOQUE 07		2,6%	0,7%
2	BLOQUE 12		1,9%	0,8%
3	BLOQUE 15		7,3%	2,2%
4	BLOQUE 18		3,3%	1,1%
5	BLOQUE 43		10,2%	2,8%
6	BLOQUE 56		5,5%	2,2%
7	BLOQUE 57		31,7%	15,9%
8	BLOQUE 60		21,1%	6,3%
9	BLOQUE 61	for 9&10 unprotect the input sheets and expand the	16,4%	
10		question section ("+" in row 66)		7,3%

Participant 2 | 1 | | α: 0,1 CR: 7% 1

Name | Weight | Date | Consistency Ratio

i	j	Criteria A	Criteria B	more important ? A or B	Scale (1-9)
1	2	BLOQUE 07	BLOQUE 12	A	1
1	3		BLOQUE 15	B	3
1	4		BLOQUE 18	B	1
1	5		BLOQUE 43	B	4
1	6		BLOQUE 56	B	3
1	7		BLOQUE 57	B	7
1	8		BLOQUE 60	B	6
2	3	BLOQUE 12	BLOQUE 15	B	5
2	4		BLOQUE 18	B	3
2	5		BLOQUE 43	B	7
2	6		BLOQUE 56	B	5
2	7		BLOQUE 57	B	8
2	8		BLOQUE 60	B	8
3	4	BLOQUE 15	BLOQUE 18	A	2
3	5		BLOQUE 43	B	1
3	6		BLOQUE 56	A	2
3	7		BLOQUE 57	B	4
3	8		BLOQUE 60	B	5
4	5	BLOQUE 18	BLOQUE 43	B	4
4	6		BLOQUE 56	B	3
4	7		BLOQUE 57	B	6
4	8		BLOQUE 60	B	6
5	6	BLOQUE 43	BLOQUE 56	A	3
5	7		BLOQUE 57	B	4
5	8		BLOQUE 60	B	2
6	7	BLOQUE 56	BLOQUE 57	B	7
6	8		BLOQUE 60	B	5
7	8	BLOQUE 57	BLOQUE 60	A	1
1	9	BLOQUE 07	BLOQUE 61	B	6
1	10				
2	9	BLOQUE 12	BLOQUE 61	B	7
2	10				
3	9	BLOQUE 15	BLOQUE 61	B	3
3	10				
4	9	BLOQUE 18	BLOQUE 61	B	5
4	10				
5	9	BLOQUE 43	BLOQUE 61	B	2
5	10				
6	9	BLOQUE 56	BLOQUE 61	B	4
6	10				
7	9	BLOQUE 57	BLOQUE 61	A	6
7	10				
8	9	BLOQUE 60	BLOQUE 61	A	1
8	10				
9	10				

Intensity	Definition	Explanation
1	Equal importance	Two elements contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one element over another
5	Strong Importance	Experience and judgment strongly favor one element over another
7	Very strong importance	One element is favored very strongly over another, it dominance is demonstrated in practice
9	Extreme importance	The evidence favoring one element over another is of the highest possible order of affirmation
2,4,6,8 can be used to express intermediate values		

AHPcalc-2018-09-15-In2

AHP Analytic Hierarchy Process

n= 9 Input 3

Objective: Evaluation of Associated Gas Potential Using Multi-Criteria Analysis (MCA)

Only input data in the light green fields!

Please compare the importance of the elements in relation to the objective and fill in the table: Which element of each pair is more important, **A or B**, and **how much** more on a scale 1-9 as given below.
Once completed, you might adjust highlighted comparisons 1 to 3 to improve consistency.

n	Criteria	Comment	RGMM	+/-
1	BLOQUE 07		2,5%	1,3%
2	BLOQUE 12		1,7%	0,8%
3	BLOQUE 15		6,8%	2,6%
4	BLOQUE 18		3,3%	1,6%
5	BLOQUE 43		8,8%	3,6%
6	BLOQUE 56		5,6%	3,3%
7	BLOQUE 57		34,1%	15,9%
8	BLOQUE 60		22,8%	9,1%
9	BLOQUE 61	for 9&10 unprotect the input sheets and expand the	14,5%	
10		question section ("+" in row 66)		5,9%

Participant 3 | 1 | Name | Weight | Date

α: 0,1 CR: 8% Consistency Ratio

1

A
B

i	j	A		B	more important ? A or B	Scale (1-9)
1	2	BLOQUE 07		BLOQUE 12	A	3
1	3			BLOQUE 15	B	4
1	4			BLOQUE 18	B	3
1	5			BLOQUE 43	B	5
1	6			BLOQUE 56	B	4
1	7			BLOQUE 57	B	8
1	8			BLOQUE 60	B	5
2	3	BLOQUE 12		BLOQUE 15	B	4
2	4			BLOQUE 18	B	2
2	5			BLOQUE 43	B	6
2	6			BLOQUE 56	B	6
2	7			BLOQUE 57	B	9
2	8			BLOQUE 60	B	9
3	4	BLOQUE 15		BLOQUE 18	A	2
3	5			BLOQUE 43	B	1
3	6			BLOQUE 56	A	3
3	7			BLOQUE 57	B	6
3	8			BLOQUE 60	B	6
4	5	BLOQUE 18		BLOQUE 43	B	4
4	6			BLOQUE 56	B	5
4	7			BLOQUE 57	B	7
4	8			BLOQUE 60	B	7
5	6	BLOQUE 43		BLOQUE 56	A	4
5	7			BLOQUE 57	B	5
5	8			BLOQUE 60	B	4
6	7	BLOQUE 56		BLOQUE 57	B	8
6	8			BLOQUE 60	B	6
7	8	BLOQUE 57		BLOQUE 60	A	2
1	9	BLOQUE 07		BLOQUE 61	B	6
1	10					
2	9	BLOQUE 12		BLOQUE 61	B	7
2	10					
3	9	BLOQUE 15		BLOQUE 61	B	3
3	10					
4	9	BLOQUE 18		BLOQUE 61	B	4
4	10					
5	9	BLOQUE 43		BLOQUE 61	B	3
5	10					
6	9	BLOQUE 56		BLOQUE 61	B	5
6	10					
7	9	BLOQUE 57		BLOQUE 61	A	5
7	10					
8	9	BLOQUE 60		BLOQUE 61	A	2
8	10					
9	10					

Intensity	Definition	Explanation
1	Equal importance	Two elements contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one element over another
5	Strong Importance	Experience and judgment strongly favor one element over another
7	Very strong importance	One element is favored very strongly over another, it dominance is demonstrated in practice
9	Extreme importance	The evidence favoring one element over another is of the highest possible order of affirmation
2,4,6,8 can be used to express intermediate values		

AHPcalc-2018-09-15-In3

AHP Analytic Hierarchy Process

n= 9 Input 4

Objective: Evaluation of Associated Gas Potential Using Multi-Criteria Analysis (MCA)

Only input data in the light green fields!

Please compare the importance of the elements in relation to the objective and fill in the table: Which element of each pair is more important, **A or B**, and **how much** more on a scale 1-9 as given below.

Once completed, you might adjust highlighted comparisons 1 to 3 to improve consistency.

n	Criteria	Comment	RGMM	+/-
1	BLOQUE 07		2,0%	1,0%
2	BLOQUE 12		1,4%	0,7%
3	BLOQUE 15		7,0%	3,2%
4	BLOQUE 18		2,4%	0,9%
5	BLOQUE 43		13,1%	4,4%
6	BLOQUE 56		5,3%	2,9%
7	BLOQUE 57		28,2%	12,4%
8	BLOQUE 60		19,8%	8,1%
9	BLOQUE 61	for 9&10 unprotect the input sheets and expand the	20,9%	
10		question section ("+" in row 66)		8,7%

Participant 4	1		α: 0,1	CR: 7%	1
Name	Weight	Date		Consistency Ratio	

i	j	Criteria A	Criteria B	more important ? A or B	Scale (1-9)
1	2	BLOQUE 07	BLOQUE 12	A	3
1	3		BLOQUE 15	B	7
1	4		BLOQUE 18	B	2
1	5		BLOQUE 43	B	8
1	6		BLOQUE 56	B	6
1	7		BLOQUE 57	B	9
1	8		BLOQUE 60	B	6
2	3	BLOQUE 12	BLOQUE 15	B	8
2	4		BLOQUE 18	B	3
2	5		BLOQUE 43	B	9
2	6		BLOQUE 56	B	8
2	7		BLOQUE 57	B	9
2	8		BLOQUE 60	B	9
3	4	BLOQUE 15	BLOQUE 18	A	4
3	5		BLOQUE 43	B	2
3	6		BLOQUE 56	A	2
3	7		BLOQUE 57	B	6
3	8		BLOQUE 60	B	6
4	5	BLOQUE 18	BLOQUE 43	B	7
4	6		BLOQUE 56	B	4
4	7		BLOQUE 57	B	8
4	8		BLOQUE 60	B	8
5	6	BLOQUE 43	BLOQUE 56	A	6
5	7		BLOQUE 57	B	3
5	8		BLOQUE 60	B	2
6	7	BLOQUE 56	BLOQUE 57	B	7
6	8		BLOQUE 60	B	6
7	8	BLOQUE 57	BLOQUE 60	A	2
1	9	BLOQUE 07	BLOQUE 61	B	8
1	10				
2	9	BLOQUE 12	BLOQUE 61	B	9
2	10				
3	9	BLOQUE 15	BLOQUE 61	B	6
3	10				
4	9	BLOQUE 18	BLOQUE 61	B	7
4	10				
5	9	BLOQUE 43	BLOQUE 61	B	2
5	10				
6	9	BLOQUE 56	BLOQUE 61	B	8
6	10				
7	9	BLOQUE 57	BLOQUE 61	A	2
7	10				
8	9	BLOQUE 60	BLOQUE 61	A	1
8	10				
9	10				

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