Life performance of oil and gas platforms for various production profiles and feed compositions

Oil and gas platforms present similar structural designs but process fluids with different thermo-physical and chemical properties, and with varying flowrates (variability of the gas-to-oil and water-to-oil ratios over time). It is therefore not possible to suggest a standard flow diagram of these facilities. Different processes and operating modes may be implemented to maximize the petroleum production and improve the overall system performance. The present work evaluates, in a first step, the variations of the heating, cooling and power demands over time, in terms of energy and exergy. The simulations were calibrated using actual field data (feed compositions and production profiles). In a second step, the minimum energy and exergy losses of the platform are assessed by performing a thermodynamic analysis, assuming an ideal scenario in which all processes are run at their design points. This approach proves to be useful for evaluating consistently different options for oil and gas production, and for determining, in a further step, the most promising solutions for minimizing the energy use over a field lifetime. The compression (natural gas and carbon dioxide) processes represent the major share of the total power demand (≥80%) for all feed compositions, at all stages of the field life. The power and heat generation system is responsible for about 60–70% of the total exergy destruction over time, followed by the gas treatment and membrane units. Efforts should therefore focus on a more efficient design and operation of the gas compression units, which are designed to handle the peak production of hydrocarbons, and on the valorisation of the turbine exhausts. Alternative CO2-treatment processes may also be of interest for feeds with high CO2-composition.

General information
State: Published
Organisations: Department of Mechanical Engineering, Thermal Energy, University of São Paulo
Contributors: Nguyen, T., de Oliveira Júnior, S.
Pages: 583-594
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Energy
Volume: 161
ISSN (Print): 0360-5442
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 5.6 SJR 1.99 SNIP 1.923
Web of Science (2017): Impact factor 4.968
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.17 SJR 1.974 SNIP 1.823
Web of Science (2016): Impact factor 4.52
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 5.03 SJR 2.22 SNIP 2.037
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 5.7 SJR 2.575 SNIP 2.602
Web of Science (2014): Impact factor 4.844
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 5.02 SJR 2.458 SNIP 2.556
Web of Science (2013): Impact factor 4.159
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 4.25 SJR 1.935 SNIP 2.214
Web of Science (2012): Impact factor 3.651
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 4 SJR 1.566 SNIP 2.01
Web of Science (2011): Impact factor 3.487
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.712 SNIP 2.46
Web of Science (2010): Impact factor 3.597
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.663 SNIP 2.357
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.103 SNIP 1.438
Scopus rating (2007): SJR 0.902 SNIP 1.434
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.851 SNIP 1.315
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.942 SNIP 1.153
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.703 SNIP 1.105
Scopus rating (2003): SJR 1.024 SNIP 1.45
Scopus rating (2002): SJR 0.806 SNIP 1.257
Scopus rating (2001): SJR 1.079 SNIP 1.089
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.698 SNIP 0.962
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.624 SNIP 0.687
Original language: English
Keywords: Energy analysis, Exergy analysis, Lifetime performance, Oil and gas platform, Process modelling
DOIs: 10.1016/j.energy.2018.07.121
Source: Findit
Source-ID: 2437976763
Research output: Research - peer-review › Journal article – Annual report year: 2018