Sustainable chemical processing and energy-carbon dioxide management: review of challenges and opportunities - DTU Orbit (03/01/2019)

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This paper presents a brief review of the available energy sources for consumption, their effects in terms of CO2-emission and its management, and sustainable chemical processing where energy-consumption, CO2-emission, as well as economics and environmental impacts are considered. Not all available energy sources are being utilized efficiently, while, the energy source causing the largest emission of CO2 is being used in the largest amount. The CO2 management is therefore looking at "curing" the problem rather than "preventing" it. Examples highlighting the synthesis, design and analysis of sustainable chemical processing in the utilization of biomass-based energy-chemicals production, carbon-capture and utilization with zero or negative CO2-emission to produce value added chemicals as well as retrofit design of energy intensive chemical processes with significant reduction of energy consumption are presented. These examples highlight issues of energy sustainable design, energy-CO2 neutral design, energy-retrofit design, and energy-process intensification. Finally, some perspectives on the status and future directions of carbon dioxide management are given.

General information
State: Published
Organisations: Department of Chemical and Biochemical Engineering, KT Consortium, National Institute of Technology Warangal
Contributors: Frauzem, R., Vooradi, R., Bertran, M., Frauzem, R., Anne, S. B., Gani, R.
Pages: 440-464
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Chemical Engineering Research & Design
ISSN (Print): 0263-8762
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.08 SJR 0.847 SNIP 1.381
Web of Science (2017): Impact factor 2.795
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.79 SJR 0.821 SNIP 1.348
Web of Science (2016): Impact factor 2.538
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.7 SJR 0.852 SNIP 1.434
Web of Science (2015): Impact factor 2.525
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.91 SJR 1.022 SNIP 1.671
Web of Science (2014): Impact factor 2.348
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.56 SJR 0.953 SNIP 1.673
Web of Science (2013): Impact factor 2.281
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.31 SJR 0.918 SNIP 1.611
Web of Science (2012): Impact factor 1.927
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.12 SJR 0.903 SNIP 1.327
Web of Science (2011): Impact factor 1.968
ISI indexed (2011): ISI indexed yes