Source: depositphotos.com/shirophoto

According to International Energy Agency (IEA), the chemical and petrochemical industry accounts for 30 per cent of global industrial energy use and 16 per cent of direct CO_2 emissions.

Managing Emissions in the Carbon World

Controlling CO_2 emissions is the need of the hour

Companies can accurately manage their carbon footprint and assess the effectiveness of their greenhouse gas emissions while safeguarding the long-term competitiveness and profitability of their business by adopting innovative software.

Sunil Patil
Senior Principal Business Consultant (Engg) APAC
Aspen Technology, Inc
sunil.patil@aspentech.com

We live in a world that is reliant upon carbon. We exploit it, consume it, shape it, burn it, wear it and, in fact, this chemical element is the basis of life. The irony is that such dependence on carbon has led to a world where there are more carbon sources. And hence, we spend enormous efforts trying to mitigate its environmental impact.

Managing carbon emissions and meeting environmental regulations is a high priority for governments and manufacturing businesses across the globe. Leaders fiercely debate the significance of climate change that has occurred in recent decades. While industrial technology is partly responsible for leaking carbon emissions into the atmosphere, technology can also play an important role to manage and reduce carbon dioxide (CO_2) output. In addition, companies need to explore the use of more sustainable biofuels that can provide considerable emission reductions as compared to the use of fossil gasoline and diesel.

Tracking the impact of the carbon footprint

The majority of greenhouse gases (GHG) are derived from burning fossil fuels to produce energy. The petroleum industry has been widely cited as the main offender when it comes to releasing large amounts of carbon dioxide and other GHGs into the atmosphere.

According to International Energy Agency (IEA), the chemical and petrochemical

industry accounts for 30 per cent of the global industrial energy use and 16 per cent of direct CO_2 emissions. More than half of the hydrocarbons used in the industry are for feedstock, which cannot be reduced through energy efficiency measures.

Climate scientists have reported that CO_2 concentrations in the atmosphere have increased significantly over the past century. It is this increase in CO_2 and other so-called GHGs that is being held responsible for climate change. Concern over the earth's global warming and the impact of CO_2 emissions has fuelled much debate and prompted industry leaders and governments to work together more collaboratively. The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty that sets binding obligations on industrialized countries to reduce GHG emissions. As part of the agreement, many developed countries have agreed to the legally binding limitations or reductions in their emissions. The European Union is committed to a 20 per cent reduction in energy consumption and 20 per cent fewer emissions by 2020 (this forms part of the 20-20-20 energy plan). IEA has identified energy efficiency improvements as the most significant solution to reduce emissions associated with energy consumption.

Laws across the globe

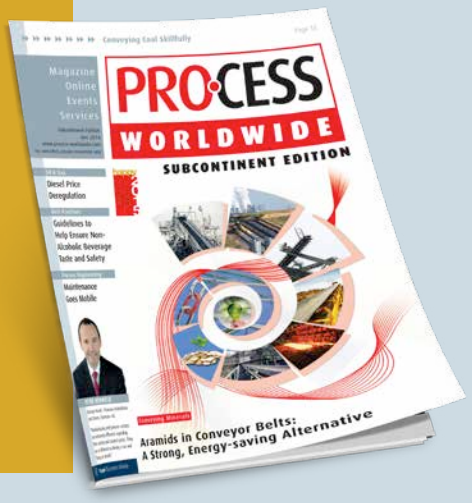
In the UK, climate laws require a reduction in emissions of at least 80 per cent (from the 1990 baseline) by 2050. The country is now looking at various methods to combat climate change and manage carbon emissions more effectively, including a technique to bury CO_2 that is emitted from power generation under the seabed.

In contrast, Russia is an energy super power that is still finding its way in modernizing plants and is looking to address its energy efficiency measures. Russia's manufacturing sector constantly emits large quantities of sulphur dioxide, nitrogen oxides and particulate matter mainly from chemical and petrochemical plants, the steel industry, power generation and other types of manufacturing, which in turn cause serious respiratory problems and environmental damage. Converting to energy efficient technology will allow Russian companies to lower energy costs and GHG emissions.

Similarly, China has emission issues, albeit for different reasons. As one of the world's fastest growing economies with an annual gross domestic product (GDP) growth rate averaging 10 per cent for the last 30 years, energy demand in China has radically accelerated and spurred major industrial development. China's reliance on the coal has contributed significantly to the pollution problem. Coal combustion generates the largest share of CO_2 emissions and this has consequently placed the country in the ignominious role of being the major producer of carbon emissions in the world. Furthermore, this has resulted in significant pollution in cities across the country from Beijing to Shanghai.

As one of the world's most developed nations, the US too has witnessed

For opportunities to increase visibility and brand recognition contact



ADMIN OFFICE:
Vogel Business Media India Pvt Ltd
32, Ground Floor, New Unique Industrial Estate,
R P Road, (Opp Jawahar Talkies),
Mulund (West), Mumbai - 400080. INDIA
T: +91 (22) 2564 4469

ASHOK THAKUR
General Manager
Mobile: +91 9819944543
ashok.thakur@vogel.de

PREETI MISHRA
Deputy General Manager
Mobile: +91 9820488203
preeti.mishra@vogel.de

DINESH MISHRA
Deputy General Manager
Mobile: +91 9833076669
dinesh.mishra@vogel.de

Vogel Business Media

Source: Aspen Technology, Inc

aspenONE Engineering software contains tools to design new plants, re-design existing plants and simulate and optimize plant processes.

tremendous industrial growth through the shale gas revolution. However, according to the US Energy Information Administration (EIA), of the total amount of US greenhouse gases emitted in 2011, about 86 per cent was energy related and 92 per cent of those energy-related gases were carbon dioxide from the combustion of fossil fuels. Petroleum is the largest fuel source of CO_2 emissions from energy consumption in the US, followed by coal and natural gas.

Further afield, growth in the oil and gas production in the Middle East has seen carbon emissions increase in recent decades. The huge demand for energy both domestically and internationally has meant that the use of petrochemicals and other environmentally noxious materials has contributed significantly to the deterioration of the region's air quality and atmospheric conditions. The oil and gas industry, electricity production, transportation, industrial heating and air-conditioning are responsible for the vast majority of carbon emissions from the Middle East region. Qatar, Kuwait, UAE, Bahrain and Saudi Arabia are among the world's top 10 per capita carbon emitters. Although the Middle East is not bound to GHG emission reductions by the Kyoto Protocol, industry operators and governments in the region are making commitments to reduce CO_2 emissions. Interestingly, many global companies are reluctant to embark on emission reduction initiatives due to the misconception that such measures would be unprofitable.

A report published by Booz & Co reveals that the "recent experience in the oil and gas industry in the Middle East proves otherwise. One national oil company, for example, identified the potential for a 43 per cent reduction in emissions with a net present value of several billion US dollars using a systematic and programmatic approach."

Software helps to model, track and reduce CO_2

Process manufacturers face increasing regulatory requirements, emission penalties and rising operating costs. Process plant design and optimization, therefore, requires rigorous management of carbon emissions to mitigate the effect of carbon on the environment. Leading engineering modeling software can help the process industry identify and define opportunities to reduce carbon emissions.

Steps for reducing the carbon footprint of a facility are listed below:

- Selecting a different process route – one which is inherently 'cleaner' in terms of CO_2 emissions
- Maximizing or optimizing energy efficiency to reduce the plant's dependency on fossil fuels and
- Considering carbon capture. For example, using biomass converted from CO_2 (e.g. algae) or left over from an industrial process and either using it as a feedstock material to reduce the plant's dependency on fossil fuels or to produce biofuels can offer the opportunity to further reduce carbon emissions.

The software tools contain powerful features to model, track and reduce CO_2 emissions more effectively and comparatively earlier in the design process. Companies could achieve emission reductions of up to 40 per cent through improvements in operations and maintenance and investments in energy efficiency measures at the equipment and process levels. Also, the use of cutting-edge software tools to model and manage the operations play a significant role in the process.

Many leading process manufacturers have turned to AspenTech to better understand and reduce their carbon footprints. aspenONE Engineering software contains tools to design new plants, re-design existing plants and simulate and optimize plant processes. With the integrated aspenONE software, process manufacturers can optimize their engineering, manufacturing and supply chains more effectively.

Managing a cleaner and better world

A world with more effective carbon management will mean a major reduction of CO_2 emissions. This will result in improved urban air quality, greater use of fossil fuel resource and more efficient running of industrial operations to maximize energy usage.

In the future, it will be critical that companies nurture innovation and support more sustainable biofuels that provide considerable emission reductions as compared to the use of fossil gasoline and diesel. The ability of companies to monitor and track emissions from their plants is essential to meet regulations.

Companies that also adopt innovative software can accurately manage their carbon footprint and assess the effectiveness of their greenhouse gas emissions while safeguarding the long-term competitiveness and profitability of their business.