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Rock Bottom View: “Sustainability/Renewability.... What the Heck is it Really All About”



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Howdy again. EPM's November edition offers another chance to chat and compare notes on critical issues driving the future of our industry. Before, I have come to you from my old writing desk on the deck of my Rock Bottom Ranch house in Texas. During September, the theme was “**Man, it's really hot outside!**”. To that end, I am making a soft transition toward relocation down to Mexico and so, have put the Texas ranch on the sale block. The central Texas spread is indeed a sweet place, but the reality of global warming has become personal; the summers are just too brutally hot.

After lots of research and travel to determine the “world's best climate”, I believe the mountains of western Jalisco, Mexico, to the east of Puerto Vallarta provides that answer. At 5000 feet of elevation, the climate is temperate, usually in the 70'sF/21C and varies only about twenty degrees F/7C during the year. Summer is rainy and provides for bountiful soil and produce. Winter is dry and rarely freezes. Amenities are plentiful nearby in Puerto Vallarta. My hope is to maintain this sweet balance as long as possible.

Continuing our monitoring of, and responsible leadership toward, improved global climate/water/soil plus simultaneous plentiful energy/durable goods, we would appreciate your thoughts.

SUSTAINABILITY IN ENERGY AND PETROCHEM: WHAT TO EXPECT SOON

The words "sustainable" and "renewable" are often used to describe certain sources of primary energy, often interchangeably. However, these words have very different meanings. Not everything renewable is sustainable, and in turn, not everything which is sustainable is necessarily renewable.

RENEWABLE ENERGY

Literally 'to make new again', a renewable resource is one that is naturally replenished with time, like the growth of new organisms or natural recycling of materials. Renewable energy is any energy production which uses one of these resources. Renewable resources do not have a fixed quantity - more can always be generated. However, if the

rate of use exceeds the rate of renewal - that is, the source is used more than it's being re-created - its continued use will become unsustainable.

Generally, renewable energy is taken to mean any of the following:

- Solar power
- Wind power
- Hydropower
- Tidal power
- Geothermal power

Resources are considered non-renewable if they take a very long time to be created (e.g., fossil fuels) or if their creation happened long ago and is not likely to happen again (e.g. uranium). Primary energy flows are almost always renewable. On the other hand, biofuels are renewable and definitely count as fuels.

SUSTAINABLE ENERGY

Literally, that which can be maintained for a finite period of time, sustainable energy is energy production that can last for the foreseeable future. Sustainable energy practices must rely on resources which can continue to supply our needs. These sources must be used cautiously so that they will not be used up, run out, or otherwise become unusable.

Even renewable resources can become unsustainable. If a resource is used up faster than it can regenerate, it will eventually be entirely depleted despite its renewability. Conversely, a non-renewable resource can be sustainable if it's used in moderation. Again, if used without caution, these too may become depleted in a short time.

For most people, sustainable energy use means that the environment is not significantly damaged due to accumulated effects of an energy practice. This part of the definition of sustainable energy is quite politically charged with widely varying opinions. Often advocates for fossil fuels will claim that coal, oil and natural gas are sustainable because the reserves for these are so large, discounting their combustion emission and problems with climate change. To operate, the fuels/petrochemical sector needs 30% of the Earth's carrying capacity and the industry contributes significantly to carbon emissions. Chemicals made from naphtha and other fossil fuels, like ethylene and propylene, demand a lot of resources that are not currently sustainable enough commercially.

The trajectory is shifting, though, in favor of more environmentally friendly, renewable, and bio-based goods. There are many opportunities that are even profitable, thanks to the use of renewable energy in the oil/petchem sector. The future of the oil/chemical industry will be dominated by sustainability and technological advancements in the coming years, for sure.

The primary concern for the industry is not just carbon emissions, but also the intensity of these emissions. All of the carbon dioxide released to produce electricity, accounts for this emission intensity. When fossil fuels are used, the intensity of carbon emissions increases, and this is where sustainable efforts can alter the narrative.

THE 2 DEGREE CELSIUS SCENARIO

After nations endorsed the 2015 Paris Agreement, the sustainability issue as a whole was well-received. That agreement included a number of requests for modifications, adaptations, and innovations. The commitment to keeping the average global temperature rise below 2 degrees Celsius, and lowering it all the way to 1.5 degrees Celsius is what sparked the wildfire.

To accomplish the stated goal, the oil/petrochemical industry needs strong commitment, but it was challenging to dig deep enough for large-scale businesses. There is still no assurance that the goals set forth will be accomplished because a significant reduction in energy consumption is required. But gradually, to some extent, the operations have changed, moving the agenda forward in baby steps.

So how can it be achieved?

Any oil/petchem company attempting to join the 2 degree Celsius propaganda would not be able to increase its production capacity using conventional methods. Depending on the situation, using sustainable and renewable energy sources may be the only viable option. Switching from the use of fossil fuels for production to renewable sources can help create a circular economy. In order to make this transition without losing market share, strategic business planning and portfolio management are required.

CLEAN TECH MOVEMENT

Technology that is renewable and clean does not always imply the use of solar or wind power. Clean technology emphasizes the ability to use energy more effectively while producing products that are readily able to be recycled, reused, or reproposed. Additionally,

this entails switching the raw material to something renewable, an extract, or a byproduct from another industry.

The topic of conversation right now is operational improvement.

Many petrochemical startup companies are developing innovative SaaS (subscription software) products with cutting-edge technology with the help of IoT (internet of things) in this regard, Digital Oilfields is an intriguing development to be aware of, where technology enables customized surveillance, providing useful information for enhancing overall operations.

Funding sharks are working with startup companies and accepting technological and innovative aspects in order to fulfill their commitment to building a sustainable industry. However, switching from outdated models to new ones will take some time.

For the oil/petchem industry sustainability makes a key priority, as they need to embrace new principles and processes to fight one of humanity's main challenges. United Nations have adopted 17 Sustainable Development Goals (SDGs), and two of them greatly impacting oil and gas industries: "Affordable and clean energy" and "Climate action".

Due to great volume of responsibilities to regulatory bodies, the financial community, the investors, their clients and the civil society, many companies from oil/petchem industry started implementing these goals into their operational processes. Worldwide, companies are responsibly moving the world forward to a net zero carbon future. Organizations across industries are under increasing pressure from stakeholders, regulators, and customers to report and manage the environmental impact of their business. **Technology has an important role to play in executing sustainability strategy and helping the industry decarbonize.**

FOUR STEPS TO SUSTAINABLE FUTURE PER ACCENTURE AND MICROSOFT...

For starters, the companies need to establish a true baseline — understanding holistically the environmental footprint of the organization and value chain across all scopes: emissions that directly result from its business activities; emissions from producing energy such as electricity or heating and cooling; and indirect value chain emissions as a result of other business activities, such as building and construction materials or transport.

As a first step for building successful sustainability strategy, companies need better visibility to effectively drive sustainability reporting, sustainability efforts, and business transformation. For example, collecting and connecting IoT data from devices using sensors—combined with rich services at the edge or in the cloud—provides the basis to monitor and measure activities at scale.

Secondly, the companies should identify opportunities to replace tools, systems, or activities with more efficient options and add business value. A key place to begin is evaluating the company's compute resource utilization, storage, and networking efficiencies. Simply migrating from on-premises cloud services to a hyperscale or to hybrid cloud have been shown to yield carbon and energy efficiency improvements.

Third step for sustainability strategy is to minimize the environmental footprint of company's operational systems and processes. Integrated data solutions enable organizations to examine and manage the footprints of their facilities and production processes and shift the activities of their people to be responsive to the changing requirements of a sustainable economy. For example, the use of advanced technologies can enable autonomous operations that continuously maximize efficiencies of your building systems or manufacturing processes.

The fourth step is to facilitate greater transparency and accountability through value chain, from raw materials to product creation to distribution. Up to 90 percent of an average organization's resource footprint occurs in the value chain—either upstream (through the supply chain) or downstream (in the product use phase) of its own operations. Without data, the companies can't know the full impact of each supplier in their supply chain or understand the cost and climate impacts of changing suppliers.

GOVERNMENT INTERVENTION AND SUPPORT FOR SUSTAINABILITY

Various governments have been actively promoting sustainability; for instance, Japan and South Korea have made commitments to achieve net-zero emissions by 2050. China, on the other hand, has outdone other nations by pledging to have net-zero emissions by 2030 and has set a goal of becoming carbon neutral by 2050. Similar to this, the Indonesian government has mentioned working with companies to reduce 29% of carbon emissions by 2030.

It is safe to say that European and Asian nations are working hard to clean up and green up their petrochemical industries. This unquestionably encourages players and industries to develop ever-more sustainable business models, which helps the world succeed as a whole.

CHANGING MARKET SYNERGY

With its sustainable ecosystem, lower costs, and enhanced functionality, the clean tech movement is here to stay. Investors are being picky when funding projects in the wake of the Paris Agreement, looking at how sustainable the operations in question are. Poor sustainability controls, procedures, and operations are a growing concern, but businesses are adjusting to the change gradually but steadily. The market is flooded with new ideas and technological advancements. New ideologies to reduce carbon footprints are being introduced by important players and start-ups, and largely will occupy STEM careers for current and coming technical graduates.

Recently, BASF announced plans to increase the production of synthetic ester base stocks by twofold. This is directly related to the product's numerous long-term advantages. These include, but are not limited to, cost savings, emissions reduction, biodegradability, and so on.

SABIC, a global leader in chemicals, offers another illustration. In a new collaboration with Kraton, SABIC introduced "certified renewable butadiene." When compared to butadiene made from fossil fuels, it is asserted that each kilogram of this renewable butadiene can cut carbon emissions by up to 4 kg. The second generation renewable feedstock used to create SABIC's renewable butadiene is free of palm oil and animal products, making it a great example of green technology.

Another crucial aspect of sustainability and the circular economy is recycling. With the recycling of flexible polyurethane foam from old mattresses, Covestro has been doing some amazing work there. Unilever, Danone, and Coca-Cola, among others, have made commitments to use less plastic in their consumer packaged goods.

Some energy companies have already started to pivot a huge part of their investment to production of renewables and have depreciated or divested some of their oil assets. Large corporations such as Shell, bp, Kazakhstan, have launched ambitious action plans. With the right technology in place, innovative ap-

panies can pivot rapidly to meet changing market demands and circumstances and achieve their sustainability goals. and Chevron, some also operating in Key players are looking at a range of collaborations with businesses that provide recyclable and sustainable solutions. This has two benefits: it improves brand recognition and encourages market funding and support. The market has seen a lot of activity, and the interest in sustainability is only going to increase. Energy efficiency, low carbon dioxide emission processes, and lighter feedstocks could all be advantageous to the concept as a whole.

IN A NUTSHELL

The oil/petrochemical sector faces ongoing environmental challenges, so reforms are necessary. An IEA report claims that Clean Technology Scenario products can contribute to the development of a sustainable society, and by 2050, air pollutants from fuels/chemical production should have decreased by 90%. It would be interesting to see how the players contribute to the overarching oil/fuels/petrochemical sustainability ideology in light of such lofty claims.

A number of factors, such as supply chain disruptions and political-social problems, have had an impact; the industry may experience significant value chain shifts, contributing to a sustainable planet. There may be a delay, but the certainty of change is visible in the eroding of barriers, the original ideas, and the passion for a cleaner world in general. As always, we will keep an interpretive eye on related developments down the road and bring them to you, our valuable readers. Until January, please enjoy safe and joyous holidays.

REFERENCES

Sustainability in Petchem: What to Expect Soon, November 1, 2022, by Jasleen Kauer

Sustainability transition in Oil and Gas Industry September 19, 2022, CEE Multi-Country News Center, Accenture and Microsoft comments

IEA reports, various 2022

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