Engineering service providers catalyzing change in the race to 'net-zero'

A Point of View by
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Abstract:

This article is a point of view on some of the trends and challenges related to net-zero drive, specifically for the OEMs and operators in the energy and industrial segments. The article highlights the range of services that an engineering service provider can offer an OEM/Operator to accelerate net-zero drive. It briefly introduces the Report-Reduce-Reform approach and touches upon some of the essential technology elements and their role in the race to net-zero program.

Governments, policy makers and energy companies are embroiled in an energy trilemma today. While they are trying to balance conflicting needs, setting the right priorities and making rapid progress, the mission to half the emissions by 2030, quarter it by 2040 and reach net-zero by 2050 has become an issue of utmost importance and is the need of the hour. In this context, engineering service providers play a pivotal role in helping OEMs and operators to set the right strategy to embark or accelerate the race to net-zero journey in the right direction.

"The energy trilemma, the new paradigm of decentralization and de-carbonization means that engineering service providers will evolve to become agents of change led by digitization."

Changing priorities for de-carbonization

Traditionally, engineering service providers have been supporting OEMs and operators in the energy segment to address the needs for building sufficient, reliable and resilient energy infrastructure to ensure the availability, security, access and affordability of energy. Decentralization and de-carbonization becoming the new paradigm, the role of engineering service providers has undergone a significant shift. Digitization has become an enabler/catalyst for decentralization and de-carbonization.

De-carbonization or reduction of Green House Gases (GHG) emission has become a priority for every product, plant and process and organizations need to comply with respective regulations & expectations aligned to reduce GHG. This goal can be reached by a very systematic process of "*report-reduce-reform*". There is a need to understand where we stand (*report*), take all possible necessary actions to *reduce* the emissions and *reform* the business/process leveraging emerging technologies.

Many OEMs and operators are not yet equipped with the systems, tools and processes to lead change and continue to use the conventional methods while struggling to align their journey towards net-zero goals. In this context, a forward-looking service provider must invest efforts to directly impact OEMs/operators programs and contribute towards mitigating potential environmental harm and climate change impacts.

It is obvious and needless to say that net-zero compliance (meeting goals related to no/minimal emissions) of a product or plant or process should not be an after-thought. It needs to be an 'in-built, by-design and by-plan' strategy. Also, it should not get confined to a product/program silo. It should spread across upstream (supply chain), design and development, manufacturing, packaging, shipping and downstream (who, where and how it is used), with readiness to a circular economy (reusability of full and part after the end of life).

Capturing and managing information during all phases of lifecycle of product/activity is essential and important. Also, the OEM/operator needs to have a comprehensive view of net-zero program compatibility of product and all related activities throughout. This is where conventional systems and approaches fail and a holistic approach with a new set of digitally enabled set of systems, tools and process helps.

"IoT which has been a key driver in transformative technology initiatives in the energy and industrial sectors will need to be backed by data driven insights. Pervasive technologies like AI and strong 5G infrastructure need to be net-zero ready"

Technology for sustainability

In the context of *race-to-zero* initiatives, technology plays an important role to align the existing systems and solutions and also in framing a new set of emerging solutions, systems and tools. IoT is no more an option but has become an imperative infrastructural backbone needed to capture and exchange information. A few obvious use cases are optimization to save energy, end-to-end traceability and DR programs of electrical grids. Along with IoT, implementation of AI continuously improves energy systems, factories, buildings and transportation. The popular use case of AI is in predicting the performance or failure of a process/system and thus increase efficiency. AI can also help predict the carbon footprint and help to move towards sustainability. Big data analytics, digital data model, etc. meanwhile permits users to simulate and test large systems (such as smart cities, electric grids, etc.) to reduce carbon footprint and help optimize & transform.

To address the growing need for IoT, Digital Twin, Big Data Analytics and AI use cases, there is also a need for higher speed and bandwidth. Virtual meetings and remote operations will help to reduce transportation and provide impetus to de-carbonization. In this context, 5G networks are expected to empower the IoT backbone with the needed speed and bandwidth. Block-chain technology can bring in a high degree of transparency, reliability and improved coordination throughout the value chain for goods and services related to *race-to-zero* programs. Social media and e-commerce can help the shift to sustainable, low-carbon products and services through information by collecting data and behavioral insights.

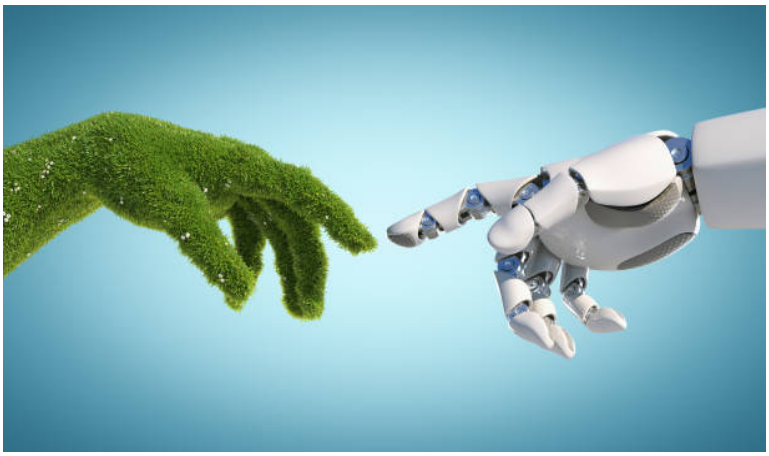
AI is the game changer

Among the above mentioned technology trends, AI needs more attention because of its impact on improvements and optimization of energy systems. In general, AI leads to error reduction, greater efficiency and reduction in the usage of raw material and shift to low-carbon scenarios. Solving the demand-supply challenges by implementation of intelligent grids (using predictive capabilities) in the context of virtual power plants is an example.

"Product engineering and product lifecycle management will remain a critical area where an integrated approach will be required to meet net-zero goals"

It starts with responsible design which will focus on modular, repairable, reusable (input/raw material to other businesses beyond the planned life cycle). The challenge is to build a platform to support all the above-mentioned aspects as an integrated suite. Such an integrated platform is envisaged to encompass product engineering, supply chain management, manufacturing engineering and after-life programs (for example, supplying the disintegrated pieces to another industry/business to realize circular economy) and provide the users with well-defined strategies, processes and tools. Real-time traceability of raw materials, product in use and product life-span is important. Geospatial technologies, data science and real-time analytics are expected to play an important role here.

A Sustainable future: led by technology, driven by collaboration



Net-zero will drive a shift in the way we source, design, package, transport, use, reuse and after-use management of products and systems. Businesses are not equipped with all that is needed to address this challenge right now. The ecosystem of OEMs, engineering platform providers and operators need to come together and build platforms to address this challenge.

By acting today and collaborating with the right technology partners in creating solutions and technology led innovations, achieving net-zero by 2050 will be a target that not only helps businesses thrive in the long term, but also ensures a safer, cleaner and more sustainable future for generations to come.

About QuEST Global

For more than 20 years, QuEST Global has been a trusted global product engineering and lifecycle services partner to many of the world's most recognized companies in the Aerospace & Defense, Automotive, Energy, Hi-Tech, Medical Devices, Rail and Semiconductor industries. With a presence in 13 countries, 56 global delivery centers and 11,250+ personnel, QuEST Global is at the forefront of the convergence of the mechanical, electronics, software and digital engineering innovations to engineer solutions for a safer, cleaner and sustainable world. QuEST Global's deep domain knowledge and digital expertise help its clients accelerate product development and innovation cycles, create alternate revenue streams, enhance consumer experience and make manufacturing processes and operations more efficient