# AADE-24-FTCE-083

# Sustainability and Localization of Suppliers – A Strategic Approach

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## Abstract

With increasing environmental concerns and global interconnectedness, the sustainability status of suppliers and their products has gained importance for businesses across industries especially in light of localization for sourcing. This paper provides an overview on the approach of exploring the synergistic relationship between sustainability practices and the localization of suppliers in drilling and completion fluids business.

Contributing to the effort for sustainability by reducing carbon emissions, one of global initiatives is the reduction of freight distances. For this to occur, local sourcing must be a viable option. In the drilling and completions fluids business, this can be a daunting task to procure all your products from different sources and still meet the technical requirements. A key focus of this paper is the development of a strategic framework for businesses to adopt sustainable supplier localization practices. This framework integrates sustainability metrics into supplier selection, evaluation, and collaboration processes. It also explores the role of digital technologies and data analytics in enhancing transparency and traceability within localized supply chains, thereby promoting sustainability goals. Localization of product brings additional benefits of supporting local economies, preserving cultural heritage, and ensuring fair labor practices.

This paper underscores the potential for businesses to achieve competitive advantages by aligning sustainability goals with localized supplier strategies. It sheds light on the need for collaborative efforts among stakeholders, including local operations, government bodies, industry associations, and businesses, to create an enabling environment for sustainable supplier localization.

This paper also contributes to the ongoing discourse on supply chain sustainability and localization by offering a holistic perspective and practical insights for businesses seeking to balance global competitiveness with responsible environmental and social stewardship.

## Introduction

The dynamics of the drilling fluids industry (DFI) is very complicated, but its primary focus has always been on its products and people. For the people, it has been relatively easy with an emphasis on technology, engineering, and client interaction. On the product side, things get relatively complicated in dealing with fluid performance, commercial competitiveness, intellectual property, regulatory compliance, environmental impact, sourcing and availability, transportation, product quality and technical differentiation to mention a major portion of product considerations. All the while keeping up with current and future directions of not just the industry but the world's priorities in general.

Sourcing products on a local level has been active for decades, but the focus had been dealing with established European manufacturers. Many of these manufactures already were supplying products to the DFI for years both in Europe and in the subsidiaries in the states. Over the past two decades, the situation has changed. Other countries have increased their output and quality of chemical products including China, Brazil, and India to mention a few significant contributors. Furthermore, certain countries with significant oil industry presence such as Saudi Arabia, have introduced initiatives (e.g., IKTVA (In-Kingdom Total Value Add)) which promote local content for products used in their countries. Either country specific initiatives such as these or stiff importation taxation has led the DFI to source locally the products necessary for remaining competitive or simply conducting business in that country. This has proven successful from both a market impact and fiscal perspective.

Another critical element that has dominated the DFI for almost 50 years has been the environmental and regulatory landscape. This has been evolving to encompass a more holistic approach towards chemical product impact as well as all activity in the workplace and specifically the rig site and industry. Essentially, the overarching initiative is termed Sustainability. There are various definitions of sustainability, but possibly one of the best is the EPA stated policy on Sustainability –

> *"To create and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations."*

To this end, the aspect of sustainability in the DFI can involve more than just chemical products, it can involve other initiatives such as tools and equipment and work process changes like automating certain activities. This paper will focus on some of the sustainability activities of SLB that specifically reduce the embodied carbon in its chemical products by reducing the CF of those specific products and/or by localization of product sourcing. Additionally, it will discuss automation efforts of certain services that help to reduce the CF at rig sites on a global basis.

Along these lines, this paper will:

1) Define specifically how sustainability relates to DFI products and automation.
2) Define elements for local sourcing criteria.
3) Outline and explain processes used to satisfy and implement to accomplish these activities.

## Drilling Fluid Product Sustainability

When considering the sustainability of drilling fluid (DF) products, the focus is on the amount of embodied carbon in each product. The embodied carbon of any product refers to the greenhouse gas emissions associated with that product. The terms often used for the greenhouse gas emissions associated with a product are the embodied carbon or Carbon Factor (CF) of that product. It is reported in CO2e (CO2 equivalents) expressed in weight, normally kg (kilograms) or t (ton/metric ton) per unit of volume or mass. There are four primary areas that contribute to the CF of any product:

1) Product Manufacturing and Positioning
2) Transportation (from manufacturer to client)
3) Product Usage – both initial and maintenance
4) End of Life of Product - Disposal or Reuse of Product

Employing learnings from other industries, the construction industry[1] shows these four segments for product sustainability visually in Figure 1. Although not 100% corresponding to the oilfield application, this diagram (Figure 1) provides a general outline of how one can approach sustainability in the oilfield from a service company's perspective.

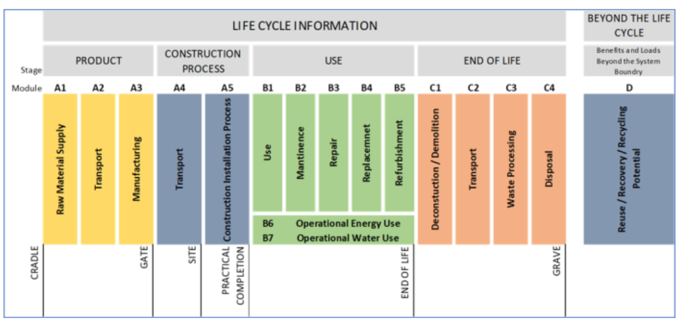



**Figure 1 – Life Cycle Assessment – Construction Industry**

Stages A1-A3 are what is known as the "Cradle-to-Gate" aspect of a product and can be applied to any product - chemical, tool, pipe, sensor, etc. This segment primarily resides with the manufacturer. The next stage, A4-A5 can be viewed as transportation. In many cases, that would be from the manufactures site to the service company's warehouse or facility (A4) and then subsequently to the rig site or client site (A5) where it is implemented for use. The USE Segment or B stages (B1-B7) may not be as applicable to the oilfield product line, but they play a role in the overall CF for each product. From an oilfield operational standpoint this segment may involve special methods of using the product or storage of materials or power consumption for a tool or unit. With the recent industry focus and move towards increased automation, introduction of these systems and tools along these lines contribute directly to decreases in product related activities such as personnel headcount, transportation, and total product efficiency. These all contribute to the sustainability profile of the rig operation. Finally, the END-OF-LIFE segment (Stages C1-C4) deal directly with the disposal, reuse, or recyclability of the product.

Many of the elements associated with the carbon factor (CF) of a product are not under the control of the service company supplying that product. Furthermore, since the CF of a product entails more than the actual product itself, there are several departments within the service company that are involved in determining the total CF associated with that product. Therefore, with the mission to lower the overall CF for a DF product, several departments can be involved to address the final lowering of any or all the five primary areas listed above.

This paper will focus only on the first two areas, that of manufacturing and transportation, which involve the technical and sourcing functions of the DFI while the remaining elements are the domain of the service company and client operations. It will also review how automation reduced CO2 emissions from an offshore installation in the Far East and the business benefit sustainability initiatives have shown in the North Sea.

## Reducing Embodied Carbon in Products

For the drilling fluids industry (DFI), addressing the task of reducing the carbon footprint (CF) of their chemical products is an immense and complex undertaking. The reasons are due to the number of products involved, the fact that few are manufactured by the service company and that the total CF is dependent on multiple departments within the drilling fluids company (i.e. technical, logistics and operations). Therefore, as stated above, the focus in this section will be reducing CF in chemical products (cradle-to-gate) and assessing the impact transportation of the CF of these products.

To start, one must determine the CF values for existing products. This is not trivial since many manufacturers, especially in the USA, have done little to nothing around calculating sustainability numbers (CFs) for their products. There are documented ways of doing this from the EPA websites.[2] Ideally, manufacturers would supply an Environmental Product Declaration (EPD) for each of their products, but these documents are not common. There are data services that can supply CF numbers for a variety of chemicals, but these are not very applicable to DFI products. Otherwise, one must work with the manufacturer to determine (calculate) a CF number for each product. In any case, the CF number requires sufficient verifiable documentation to be considered legitimate if these numbers ever become part of a regulatory exercise.

Due to the magnitude of this exercise in the DFI, not all products can be addressed simultaneously, thus there will be a need to prioritize on which products to focus. Whether this is done by volumes, sales, highest contributors, or specific markets is determined by the drilling fluids provider. Hopefully, more and more manufacturers will be able to supply the CFs for their products and this task will become easier and more readily addressed.

Reducing the carbon footprint of a product involves various approaches, such as optimizing supply chains, using renewable energy in production, improving energy efficiency, implementing sustainable materials, and promoting recycling. Lifecycle assessments can identify key areas for carbon reduction throughout the product's lifecycle. Substituting a product with a lower carbon factor alternative is a practical approach to reduce environmental impact. Consider options with eco-friendly materials, efficient manufacturing processes, and minimized transportation emissions. Life cycle analysis can guide choices, ensuring comprehensive evaluation of environmental aspects and impacts.

The elements of embodied carbon are defined in various stages of the life-cycle assessment (LCA) of each individual product. These stages are shown (Figure 1) for the construction industry, but also relate in a similar fashion to the oil industry and precisely the role SLB plays in it. As mentioned above, for the product sustaining groups (DCF and cementing), the focus is on reducing the embodied carbon in our products by concentrating on Stages A1-A3 in the product LCA.

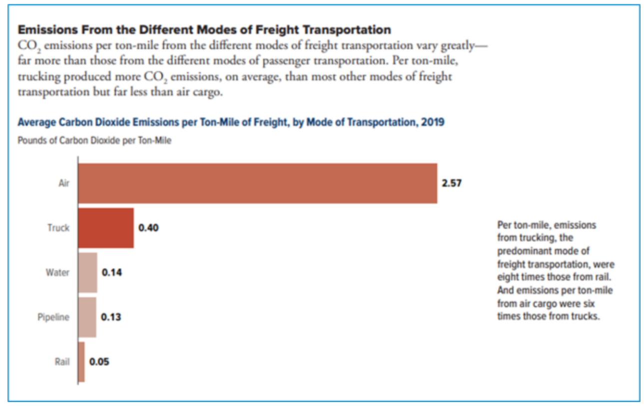
## Localization and Sustainability

Product localization is not a new concept. The initiative started several years ago to achieve operational and financial benefits. Having the product supply closer to the place of use brings obvious benefits like shorter lead times, lower logistic cost, and more simplicity in product delivery. The caveat is the associated risk of qualifying suppliers that do not have the expertise in the manufacture or the quality control process, as that the already in place at the incumbent suppliers. Introducing the proposal of locally sourced products to operators was an additional challenge.

As with global suppliers, to develop suppliers and build confidence in their delivery of consistent quality products the process of pre-shipment has proven a success with local suppliers. Once approved in the system, a new supplier is placed on pre-shipment status until enough quality data has been recorded, showing evidence that the product can be manufactured consistently and under the quality specifications. In years, local supplier qualification has matured to the point that some products are successfully tailored to the technical and economic needs of specific regions.

The growth of locally sourced products is bringing additional benefits to sustainability efforts. Further to reducing carbon footprint associated with logistics, the development of local economies brings progress to local communities. It boosts local economies by creating jobs and fostering sustainability, thus encouraging a prosperous business environment, while benefiting the communities from increased employment and economic stability.

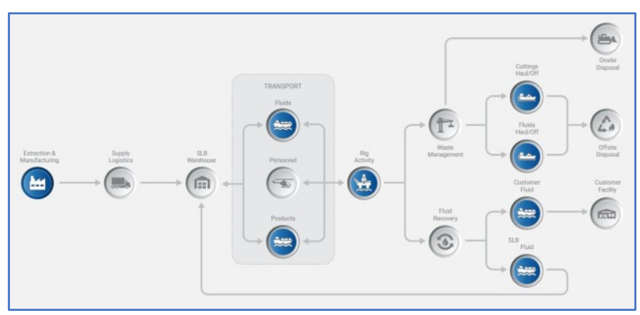
It is obvious from the sustainability perspective, the distance (kilometers) that a product is transported is directly proportional to the carbon emission given the same mode of transportation. From a transportation side, rail and waterborne transport have the lowest emissions per kilometer and unit transported, while aviation and road transport emit significantly more. Motorized transport is lower than air transport, but the volume of products shipped via truck are typically the highest contributor to total carbon emissions. Figure 2 illustrates the relative amounts of CO2 associated with various forms of transportation. (Congress, 2022)




Although the absolute numbers vary depending on several factors, the relative relationship stays the same. Therefore, this analysis lends itself to the type of transportation associated with any sourcing.

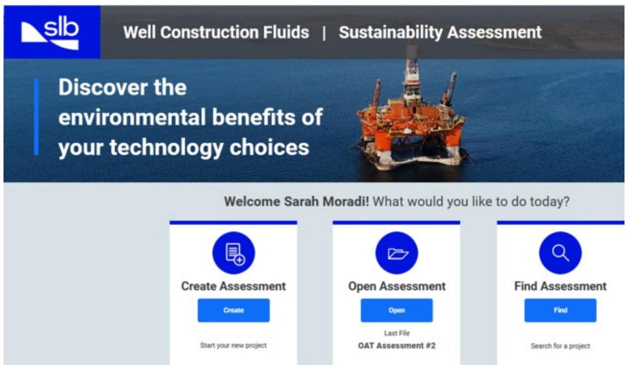
## Automation and Digitization Benefits

Automation and digitization are additional avenues to further reduce embodied carbon. This benefit would arise through carbon reductions of rig movements such as scaling down personnel. An operator in the North Sea has started moving towards this business model on 8 rigs by reducing the personnel from 4 to 2 for Drilling Fluids and Cementing personnel with remote support. The potential carbon reduction could be transport whether that is air or car transport. This carbon reduction is quite small compared to the impact that transportation of cargo or the drilling operation contributes, however it is still a contributor to the reduction of embodied carbon (see Figure 3 below).




Regardless of the contribution that reducing headcount at the rig site can have on overall sustainability, all initiatives can contribute to the reduction of total carbon emissions. (Like the diagram illustrates below in Figure 4.


Furthermore, there are internal tools which combine all the factors at the rig site to determine the total footprint. One such tool is the Sustainability Assessment Tool (Figure 5) that allows one to create a new assessment for a project, open one that is being created or search for a previous one. This tool requires various inputs, but from it one can calculate that effect that removing people from the well site has on an operation.




## Conclusions

The growth of locally sourced products brings additional benefits to sustainability efforts by bringing progress to local communities. It encourages a prosperous business environment, while benefiting the communities from increased employment and economic stability.

Automation and digitization are additional avenues to further reduce embodied carbon. This benefit would arise through carbon reductions of rig movements such as scaling down personnel. Although this reduction is quite small compared to the impact that transportation of cargo or the drilling operation contributes, all initiatives can contribute to the reduction of total carbon emissions.

## Acknowledgments

Kristel Blow, Chemical Lifecycle Assessment Lead - SLB.

## References

1. Construction industry reference
2. United States Environmental Protection Agency, https://www.epa.gov/
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