Scaling Green: Elevating your supply chain sustainability through SAP TM.

Westernacher

NONSTOP INNOVATION

The change in consumer behavior amid the pandemic is transitioning the competition from traditional marketplace to the competition on supply chain efficiency. In order to compete to increase the product accessibility and value add to the consumers, organizations are forced to adopt omni-channel supply chains. Adding layers of distribution systems are often at the cost of an increased supply chain carbon footprint. This paper is aimed to help readers better understand how SAP TM can help organizations reduce costs as a result of improved utilization, as well as how it can help in accurately measuring, monitoring, analyzing, and improving an organization's sustainability performance.

Lockdowns, congestion, shortages, stock outs—those are the words that have accompanied us since the start of the pandemic. According to a recent study including 200 senior executives across different industries, over 57% experienced serious disruptions in their supply chain and 72% reported a negative effect due to the pandemic. This disruption is accelerating their pace for investment in supply chain technologies. In fact, despite the pandemic, 92% of the companies continued investment into the transformation of digital supply chain.[1]

According to a recent survey done by U.S. Census Bureau, current retail Inventory-to-Sales ratio is at its lowest in the past 30 years. This simply means that businesses (particularly manufacturing and retail trade) are running out of inventory at a record rate, and businesses with efficient and lean operations that are capable of fast shelf replenishments are winning over customers.[2]

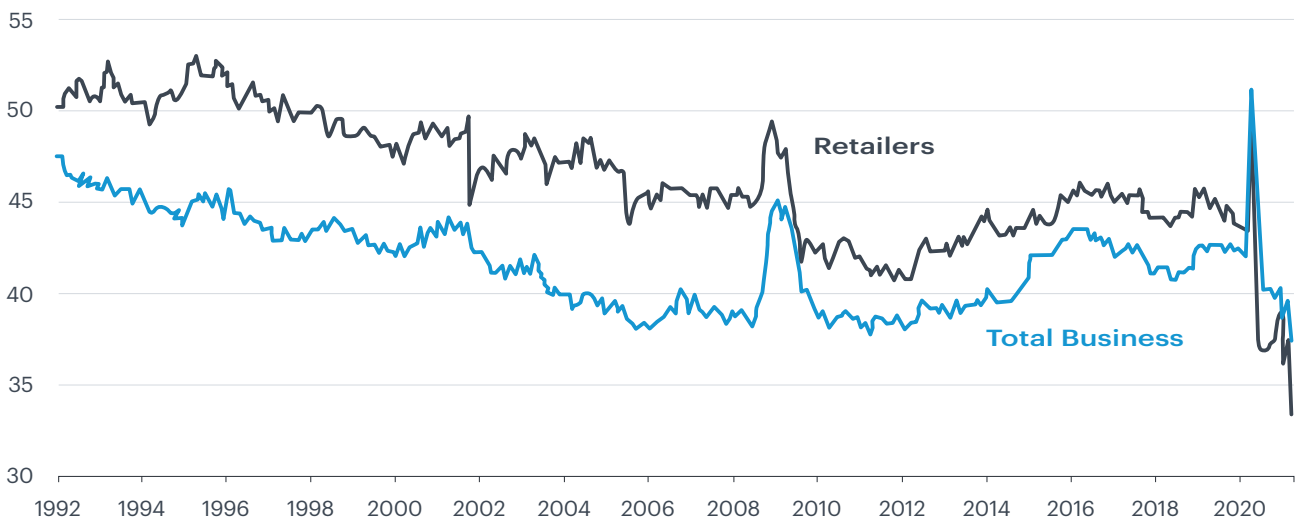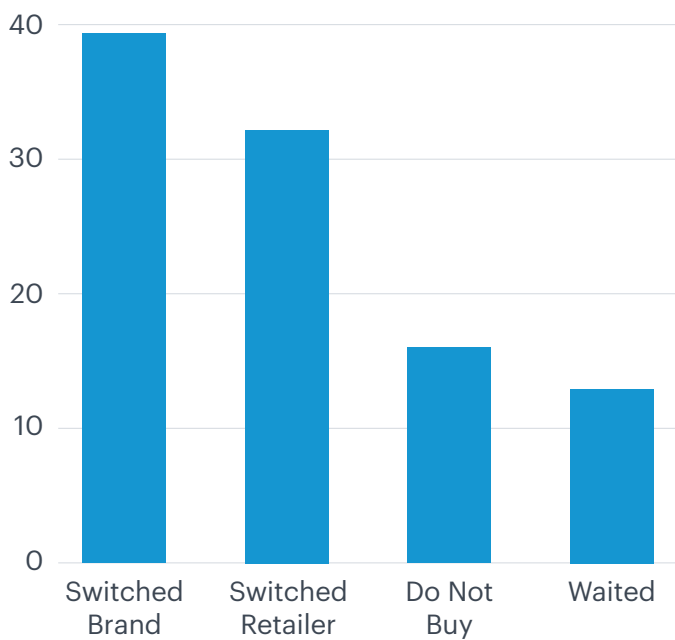### INVENTORY-TO-SALES RATIO (DAYS OF SALES IN INVENTORY)

Fig. 1: Businesses have little inventory to sell

Sources: U.S. Census Bureau; CEA Calculations

[1.] Sean Harapko, How COVID-19 impacted supply chains and what comes next
[2.] https://www.whitehouse.gov/cea/written-materials/2021/06/17/why-the-pandemic-has-disrupted-supply-chains/

IT IS WORTH NOTING THAT BASED ON A RECENT SURVEY, ONLY 13% OF CONSUMERS WERE WILLING TO WAIT FOR OUT-OF-STOCK ITEM WHILE 71% OF THE CONSUMERS EITHER SWITCHED BRAND, PRODUCT. OR WENT TO ANOTHER RETAILER, WHILE 16% DECIDED TO CANCEL THE PURCHASE

" ...Over 60 percent of US consumers have experienced out-of-stock items in the last three months, and when this happened, only 13 percent waited for the item to come back in stock versus the 39 percent who switched brand or products and the 32 percent who switched retailers..."[3]

In addition, technologies such as cellphones and tablets are changing consumer behaviors as well. Recent survey reported, Three-quarters of Americans claim to have changed their shopping behavior since the COVID-19 pandemic began. This directly contributed to the shift from away-from-home to at-home consumption as well as the surge of online shopping. The shift in consumer behavior can be characterized both as availability and convenience driven, as well as a demand for more sustainable products.[4][5]

[3]. https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/survey-us-consumer-sentiment-during-the-coronavirus-crisis

[4]. https://www.mckinsey.com/industries/paper-forest-products-and-packaging/our-insights/beyond-covid-19-the-new-consumer-behavior-is-sticking-in-the-tissue-industry

[5]. https://www.worldwildlife.org/publications/an-eco-wakening-measuring-awareness-engagement-and-action-for-nature
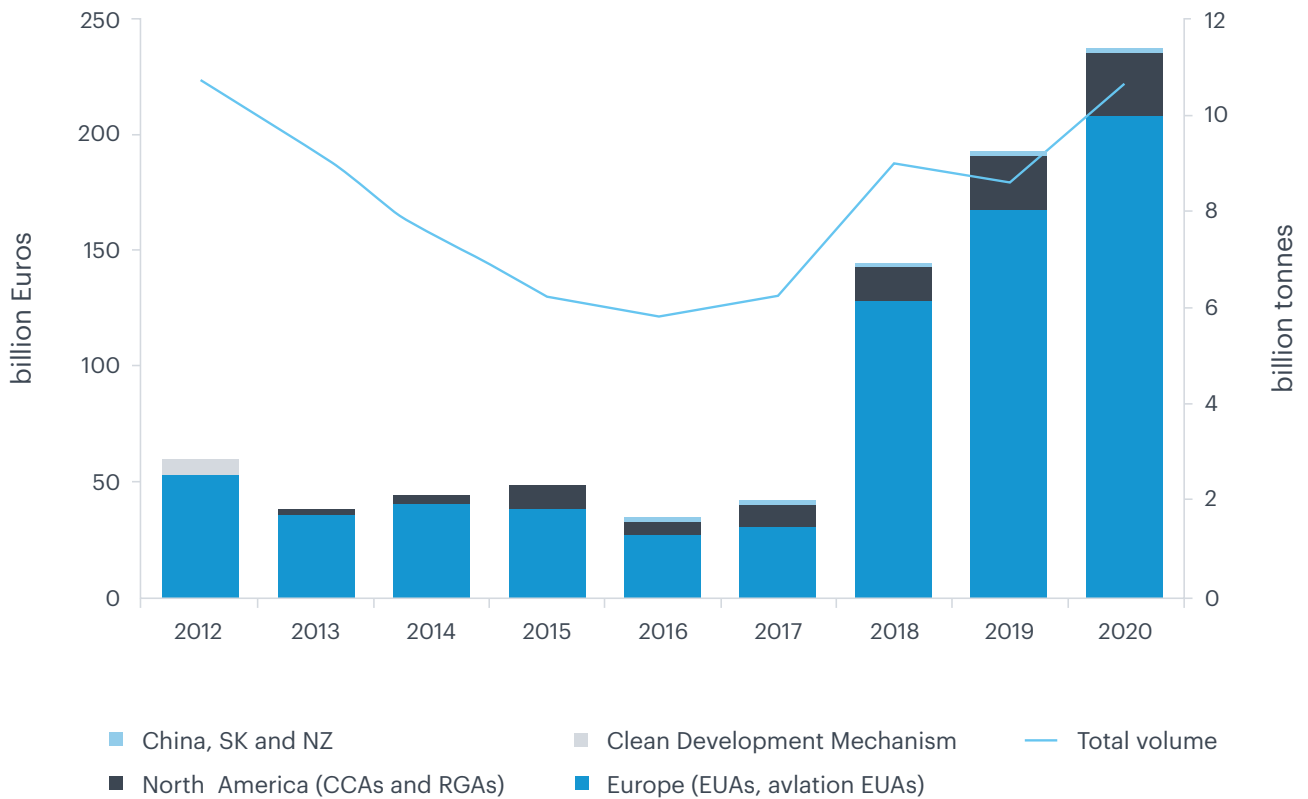
This forces more businesses to adapt to the omni-channel supply chain to target those pain points of the modern-day consumer. The result of that is a complex matrix of different layers of distribution systems, such as traditional, Direct to Store Delivery, and Drop Ship distribution, that integrates with the multi-channel retail system (online and offline) that adapts to the consumer needs. However, one of the consequences of this increasingly complex system is the growing carbon footprint.

The task of developing a sustainable supply chain becomes daunting as it requires a tailored IT infrastructure to support the functions such as carbon emission measuring, categorizing, reporting, tracking, sharing, routing, and workflows. It is important for organizations to implement the proper IT infrastructure early in order to establish good processes as it relates to sustainability. Correctly selected and implemented software is a driver for scalability, and with the right foundation can promote scaling green – so that your companies carbon emissions don't scale alongside your growing business.

Meanwhile, companies that have made the early transition into more sustainable supply chains are seeing positive financial returns on investments through reduction in fixed assets and operating costs. In addition, one of the biggest opportunities on the rise is the growing popularity of Carbon Trading System, where organizations are assigned annual emission caps. Such systems have been adopted across Europe, Asia, and certain countries / states in South and North America. Within such systems, organizations are allowed to sell off their unused carbon caps to those who failed to reduce their supply chain carbon emissions at a price that is determined by the market. Essentially, carbon emissions are being priced, regulated, and traded, like a commodity.

Depending on the different market supply demand equilibrium, the price for one ton of carbon emissions is continuously growing. Take EUA for example, the latest price for carbon emission is reported at 33.44 euros per ton as of December 2020. On a larger scale, according to a recent report

WORLD CARBON MARKETS 2012-2020, TOTAL VALUE BY SEGMENT, TOTAL VALUE

Legend:
- China, SK and NZ
- North America (CCAs and RGAs)
- Clean Development Mechanism
- Europe (EUAs, avlation EUAs)
- — Total volume

Refinitiv, January 2021

in 2021, the global carbon market is estimated to be around € 194 billion[6] and continues to grow.

Now let's take JB Hunt Transport for example, a leading transportation company in North America with over 18,500 tractors[7], averaging over 5,679,500 tons of carbon emission from tractors each year, with only 5% improvements on carbon emission would result in 296,000 tons of carbon emission reduction that is allowed to be traded. Using the Carbon Trading System this would bring over 9 million Euros in profit that JB Hunt Transport would be able to save on carbon emissions – whether this

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[6] https://www.refinitiv.com/content/dam/marketing/en_us/documents/gated/reports/carbon-market-year-in-review-2020.pdf

[7] https://www.jbhunt.com/content/dam/jbhunt/jbh/pr/press-releases/210810_JBHT_Celebrates_60_Anniversary.pdf

is through trading unused credits or savings by not purchasing additional credits. These all rely on an integrated ERP system that is capable of planning, optimizing, communicating, sharing, measuring, tracking, and tracing of an enterprise's supply chain.

Another challenge is the reverse logistics caused by reduced product cycles and various forms of returns and reusable items. The inefficiencies to capture and optimize both directions of the supply chain result in many areas of potential improvements both in corporate finance and in sustainability. Combined with the shift in consumer behavior, increased carbon emission from supply chain activities, and the rising opportunity of carbon emission trading – the time to invest in the digital supply chain transformation is now. The purpose of this paper is to assist the reader in understanding how SAP Transportation Management can help organizations tackle this issue and reduce their supply chain carbon footprint.

Understanding the challenges ahead.

In creating a sustainable supply chain, the biggest challenge is to understand the scale of your existing supply chain carbon footprint as well as the impact of sustainability improvements. To achieve that, organizations first need the proper IT infrastructure to measure and track their carbon footprint through various modes of transportation all the way down to the package level. By having a proper understanding of the scope of the carbon footprint, organization leaders can then better set up the improvement plans that align with the long-term organizational strategies.

Understanding the benefits of sustainability plays a huge part in the decision-making process by creating a business case.

ESTIMATES BASED ON 5% UTILIZATION IMPROVEMENTS

160 Metric Tons

CO2 emission saved per 10 trucks per Year

176,845 Pounds
COAL BURNED

15,717 Gallons
DIESEL CONSUMED

CO2 saving equivalent

1,828 Gallons

Reduced fuel consumption per 10 trucks per year

$63,992 Cost Savings
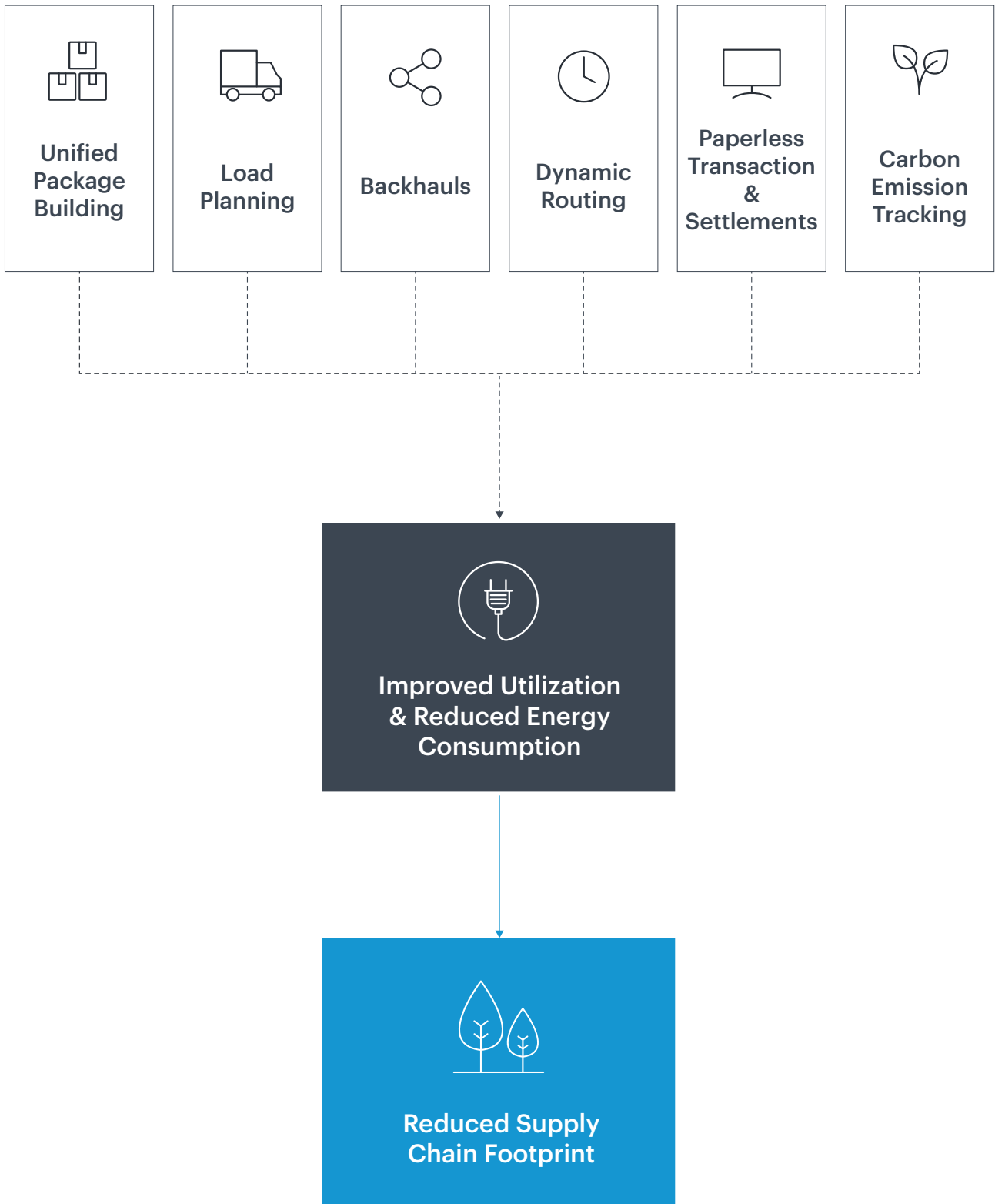
Direct fuel cost saving per 10 trucks per year

Assuming each commercial freight truck operates at 40K pounds year-round, and travels 100,000 miles each year. Each ton-mile emits 161.8 grams of CO_2. For the entire year, one single freight truck would generate 323.6 tons of CO_2. On average, it takes 103.5 gallons of fuel to generate one ton of CO_2. At $3.50 per gallon of diesel fuel, each year a freight truck would consume around $117,224 for fuel generating 323.6 tons of CO_2. The infographic above assumes a 5% utilization improvement to reduce additional trips and therefore reduce fuel consumption and CO_2 output.

Sustainability, supply chain transparency, and operational efficiency should never operate in silos. An efficient and sustainable supply chain is heavily dependent on transparency and automation. Imagine a scenario where you have a container of products shipping from Beijing to Salt Lake City. With one click of a button, you are presented with a list of options that allow you to compare the cost, lead time, even an estimate of CO_2 emission related to each solution while ensuring that every inch of the available space on each pallet is being fully utilized.

It is important to recognize that while technology can enable sustainability through process improvements and access to intelligent insights that were not previously available, ultimately it is still up to companies to adopt the changes and work to drive sustainability upstream and downstream within their supply chain. Taking package building within your organization as an example, this functionality can greatly improve the efficiency of your outbound freight – but this control does not extend to your inbound freight from vendors. Here is where developing standard operating procedures with sustainability in mind can help drive supplier behavior from areas of supply chain outside your system.
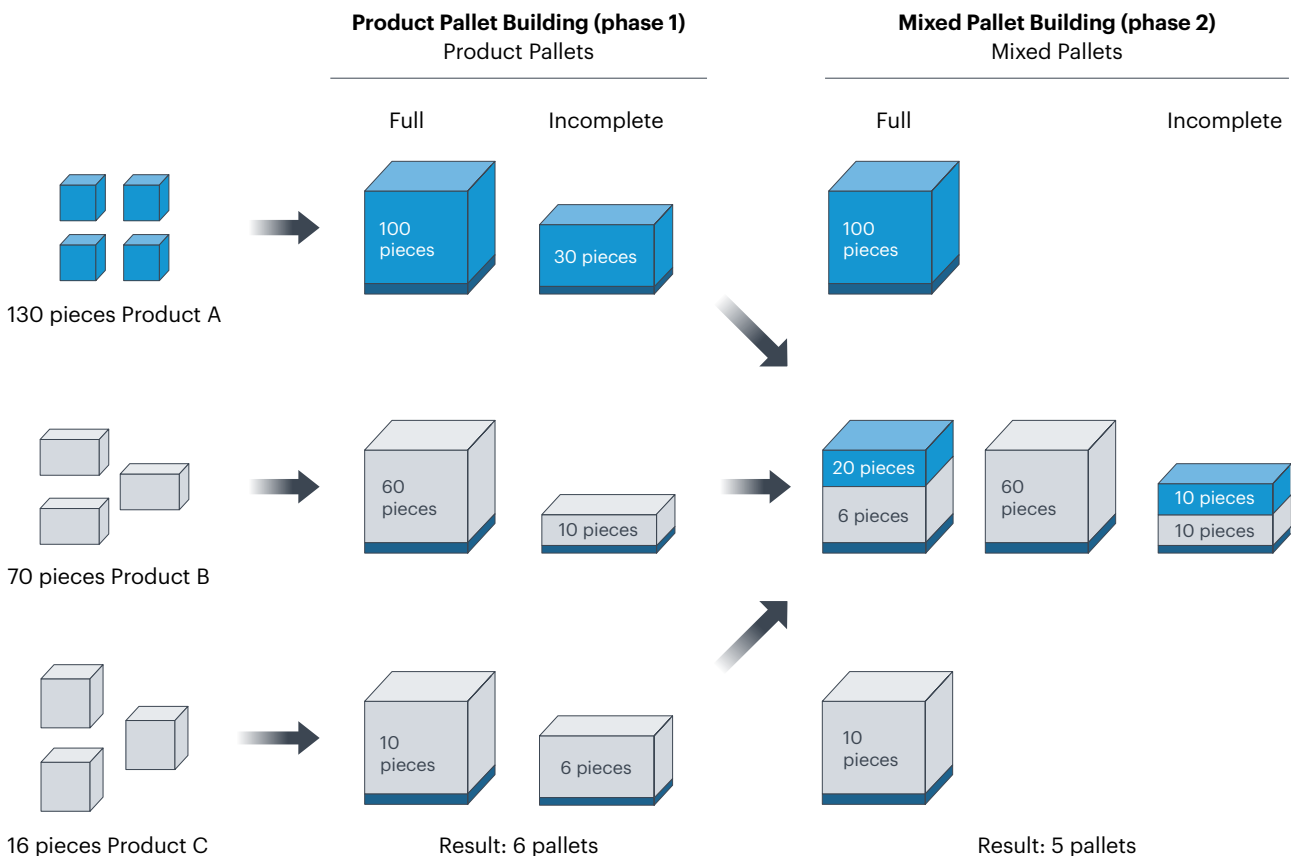
In the next section, we will look at how SAP TM can assist you to achieve planning efficiency and improve your utilization to save on your carbon emission. Following the typical logistics process from start to finish, we will break it down into 6 key functions: palletized spaces, load planning, backhaul fulfillments, dynamic routing, paperless transactions, and carbon emission tracking.

Unified Package Building	Load Planning	Backhauls	Dynamic Routing	Paperless Transaction & Settlements	Carbon Emission Tracking

Improved Utilization & Reduced Energy Consumption

Reduced Supply Chain Footprint

Unified Package Building.

To maximize the pallet utilization, SAP TM treats individual packages as pieces of blocks that are funneled into the package building engine. Depending on types of filters and incompatibility settings, as well as the type of package building (volume or detailed) those items are then being grouped for final optimization into complete pallets.

Product Pallet Building (phase 1)
Product Pallets

Full   Incomplete

130 pieces Product A   100 pieces   30 pieces

70 pieces Product B   60 pieces   10 pieces

16 pieces Product C   10 pieces   6 pieces

Result: 6 pallets

Mixed Pallet Building (phase 2)
Mixed Pallets

Full   Incomplete

100 pieces

20 pieces / 6 pieces   60 pieces   10 pieces / 10 pieces
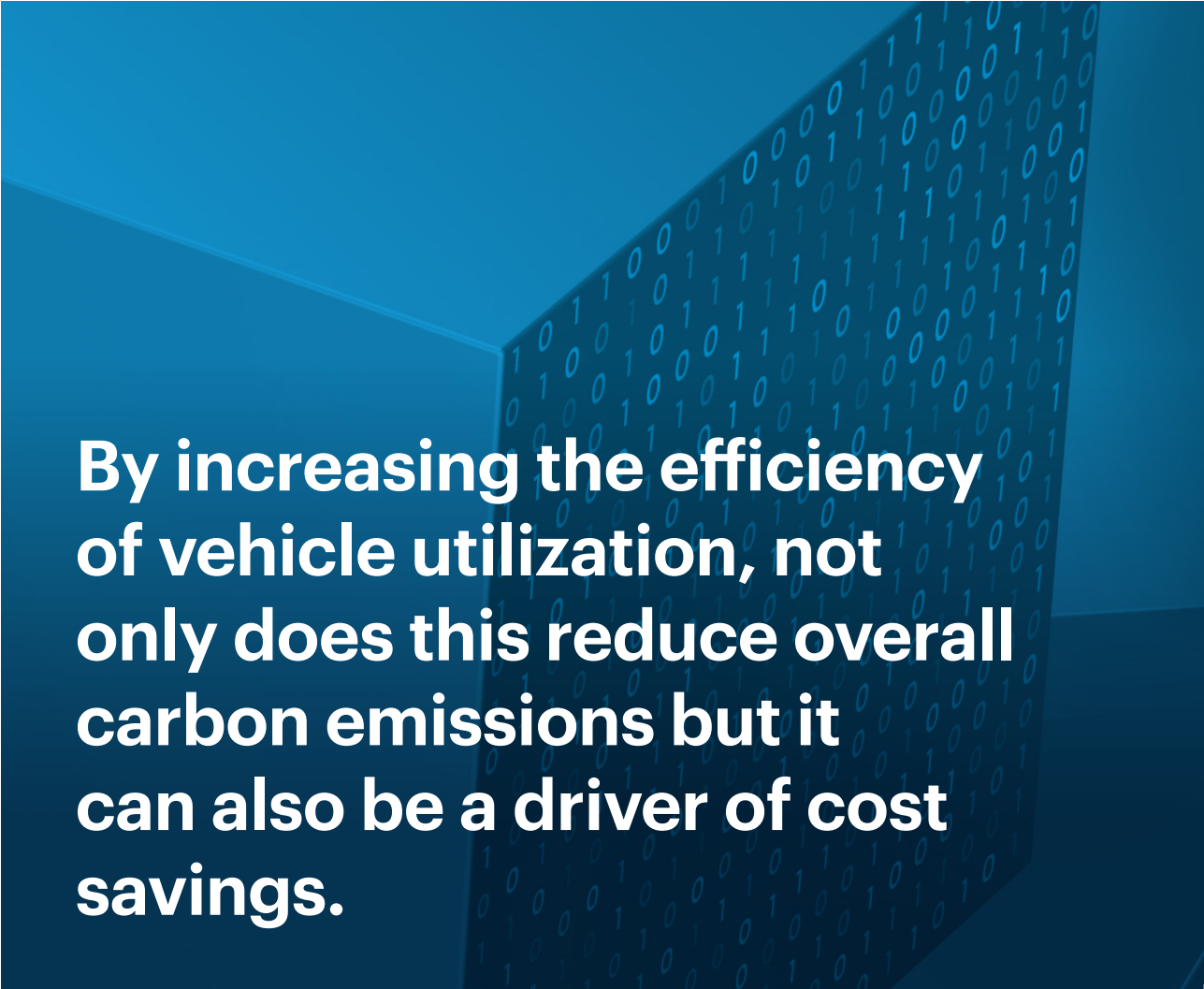
10 pieces

Result: 5 pallets

Unified Package Building can handle diverse types of products in its package building engine, each with different dimensions for the products and packaging.

It can take the 3-dimensional specs or the volume of each item into consideration and treat each item as a 'Lego block' to fill up the entire pallet of space that yields the highest fill rate for the entire pallet.

A foundation to the pallet building is the item incompatibilities. Take restaurant delivery for example, the heavy raw meat items should always stack at the bottom of the pallet, pickle jars should be in the middle, and bread buns should always place on top. In this case, the engine considers various incompatibilities so that certain items can serve as prerequisites for other items for the safety and compliance of your shipments while maximizing your pallet space utilization.

By increasing the efficiency of vehicle utilization, not only does this reduce overall carbon emissions but it can also be a driver of cost savings.

Load planning.

Different types of shipments require different methods of loading. Double stacked or single, straight or sideways, pin wheeled or weight distribution. Each one method is unique and serves its own purpose. An overweight or improperly loaded containers will cause additional waste of labor and equipment resources to reload, uneven weight distribution resulting in safety issues, overweight fines, damaged products, extended unloading lead times, etc. The list goes on.

To tackle this issue, load planning would look at a few critical inputs in determining the best solutions:

1.

Number of Stops – Determines loading sequence, later discussed in dynamic routing.

2.

Number of total pallets – Determines different loading methods such as straight, sideways, pinwheeled, or weight distributing.
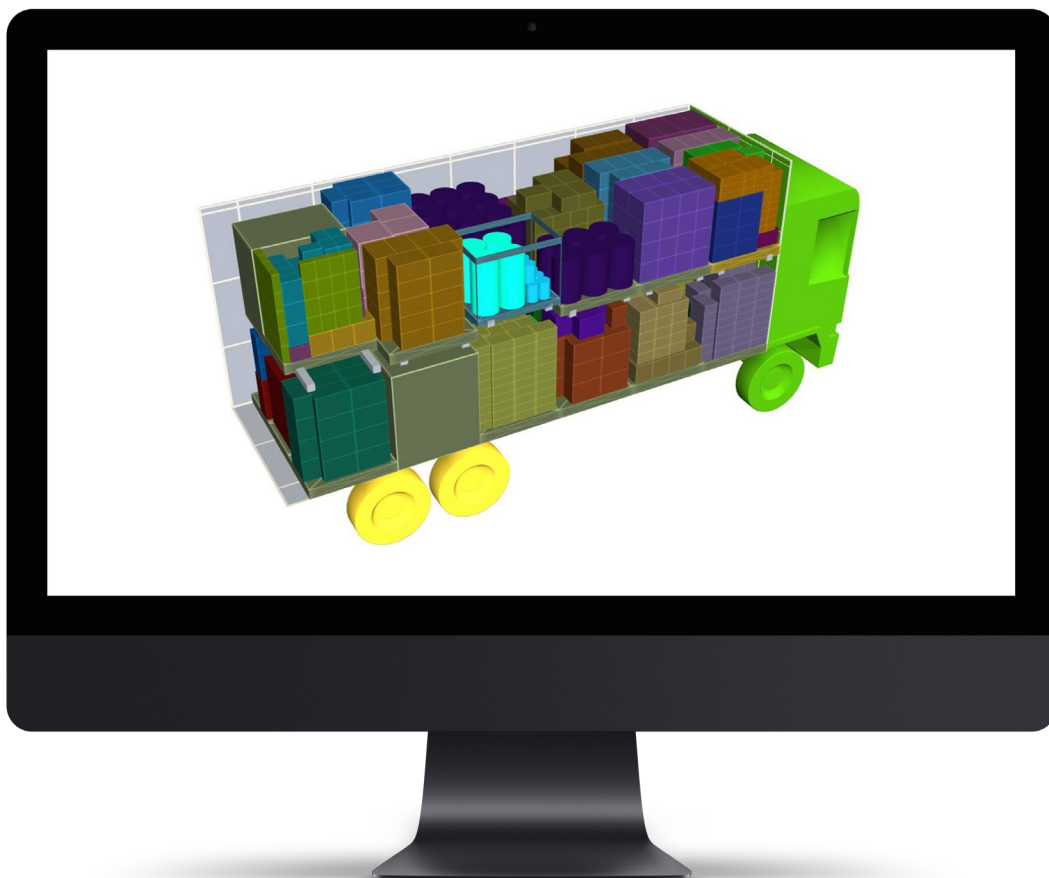
3.

Weight – To properly spread out the heavy pallets to avoid being overweight on a single axle.

4.

Incompatibilities – To ensure that no incompatible items are loaded together such as food and chemicals, or not loading pallets sideways with the presence of an electronic pallet jack.

If Unified Package Building is the focus of compliance and utilization on the individual pallet level, then the load planning is the focus on the container level.[8] The planning function is designed specifically to ensure the smooth loading process and unloading process while ensuring safety and compliance. Through package building and load planning, companies can have immediate access to various packing and loading solutions with one click of a button.

[8] https://blogs.sap.com/2019/02/04/monday-knowledge-snippet-mks-79-supply-chain-execution-package-builder-enhancements-detailed-package-building/

Backhauls.

One of the biggest opportunities for improvement for logistics operation is backhaul utilization and the number of deadheading empty miles. Typically, we can break it down into two distinct types of backhaul:

- Traditional backhauls that fill the deadheading portion of the route in attempt to generate revenue to offset or lower overall transportation costs

Under the SAP umbrella, SAP Logistics Business Network – Freight Collaboration is fully equipped with an interactive freight marketplace that allows different carriers, vendors, and brokers to post and bid on different freights real time. This means a new level of transparency for your business where you will have insight into delays, wait times, dock availability in the future before even booking the appointment.

- Returns of products, packages, and empty pallets from each service location

In this paper, we will be focusing on the return of products or materials from different service locations in a retail or final mile scenario. In SAP TM, you could combine inbound backhauls and outbound deliveries into one complete trip. For example, instead of building the load and planning it manually in multiple stages, SAP TM is capable of one click planning that automatically considers the optimized sequence for delivery and pick up based on your pre-determined critical threshold of utilization for pickups and combines all logistical activities into one integral movement.

Now let us assume this scenario: a freight truck leaving your facility with a maximum capacity of 30 pallets. In this trip, you are delivering to 5 different stops, each location has its own number of backhauls as you make your deliveries. Now from a practical standpoint if you offload 10 pallets, you can only pick up half of the amount delivered without creating extra work for your following stops or extending your lead time.

STOPS	OVERALL DELIVERY	OVERALL BACKHAUL	REMAINING BACKHAUL CAPACITY
Max Capacity	30		
Departure	28	0	1
1st Stop	22	4	4
2nd Stop	16	7	7
3rd Stop	10	10	10
4th Stop	5	13	13
5th Stop	0	18	15

Based on the critical capacity threshold you setup for your trailer (to be considered for pick up), SAP TM will automatically include all the inbound and outbound orders that meet the criteria, find the most optimal solution that allows you to pick up the most returns at each location and plan all activities with one click of a button. This function can significantly reduce the deadheading miles and improve backhaul utilization while minimizing the amount of human intervention.

FINAL MILE SCENARIO

■ Overall Del   ■ Overall Pickup   ■ Remaining Backhaul Capacity
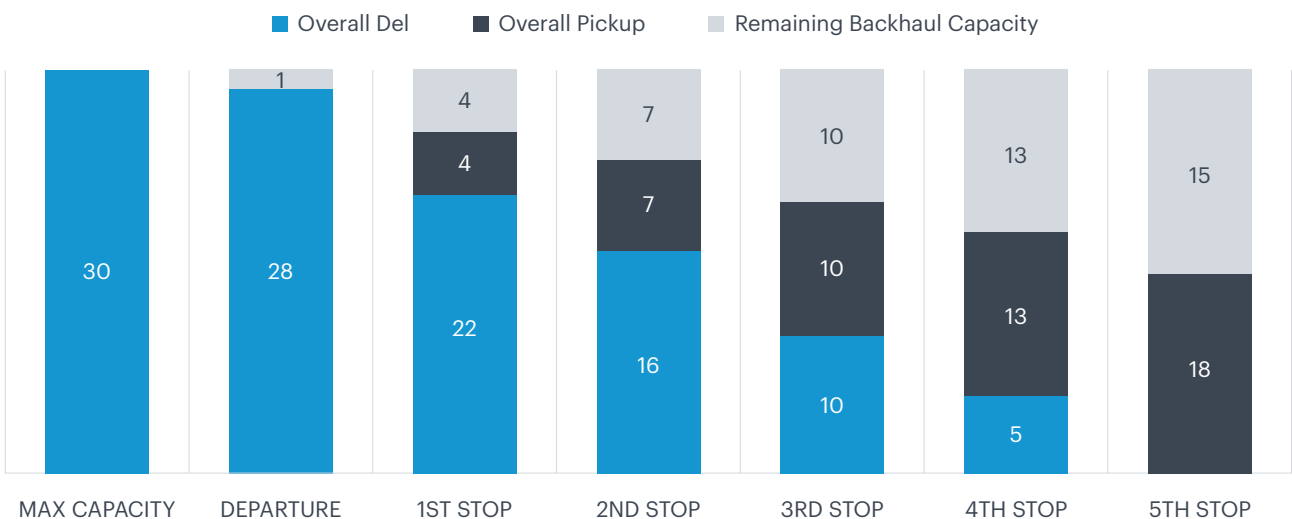
* Noticed at Stop 5 there are 6 pallets delivered but end up picking up 5 pallets. Thanks to the critical threshold setting, the optimizer will automatically place that stop as the last stop of the trip because it would not be possible to pick up all the returns if it were the 1st stop.

Dynamic routing.

Many modern supply chains are built upon multi-modal infrastructure. SAP TM breaks down the transportation process into stages. Each stage can be associated with a specific mode of transport and each stage can have as many carriers listed under as your business desires. Once SAP TM has calculated all viable options and combinations, it will present a list of transportation proposals. In addition, when combined with a visibility partner or through event reporting, SAP TM will be able to plan with more dynamic data such as port congestion, hub delays, even vendor unloading delays before the freight even left the shipping facility.

When analyzing the process at the final mile stage, regardless of parcel delivery or warehouse inventory management, one of the biggest challenges that many business faces is the "traveling salesman scenario." That is, finding the most efficient route to deliver to all destinations. To tackle this issue, SAP TM can integrate with all major GIS (Graphical Information Systems) providers for functions such as geo-coding, geo-routing, and visual map display. This allows the optimizer to identify the solutions based on real time GIS data.

This dynamic capability for one stop shops of most optimized solution gives the users much more control of its supply chain performance for planning purposes. In fact, companies have invested in transportation solutions and infrastructures are already seeing returns on their investments. According to UPS, since inception of the investment, they are reporting an average of around 100 million miles per year, which is 10 million gallons of fuel, and 100,000 metric tons of carbon dioxide emissions.[9]

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[9] https://venturebeat.com/2020/01/29/ups-will-now-use-dynamic-routing-to-get-parcels-to-you-on-time/

Streamlined communication and the digitalization of transaction documents will reduce waste from previously paper-based processes.

Paperless and real time transactions and settlements.

A modern-day supply chain requires a modern-day payment system to support strong financial performance. Your financial lead time is just as important as the inventory lead time as it directly affects your revolving cash flow and the healthiness of your business. Some modes of transportation are inherently more paper-based than others, so digitalization of those industries is essential to fully reduce paper-based processes.

From a cost management perspective, SAP TM has given its user the ability to incorporate existing contractual rates and calculation sheets into the system to ensure the accuracy of your invoices. Additionally on the accounting side, we understand that there are numerous factors driving minor fluctuations in invoice amount for logistics activities such as out-of-route miles, fuel surcharges, lumper expense, etc. The solution to that is the ability to setup acceptable ranges for the fluctuation in SAP TM. Rather than trigger credit memo for approval for every single discrepancy, SAP

TM can automatically approve the invoice if the difference is within acceptable range, further expediting the financial lead time on the transactions.

This eliminates the need for paper-based transactions, enables instantaneous access to bills, and allows visibility of outstanding invoices by all supply chain partners. Not only will this lead to increased invoice accuracy and processing time, but also paperless savings.

From an operational standpoint, we understand that various stages of transportation might be associated with different carriers in a multi-modal transport scenario, and the invoicing process are independent of each other. To allow real-time access to important documents such as proof of delivery or customs, SAP TM contains the capability to allow vendors and carriers to update key transportation executions as well as the ability to upload important documents such as signed proof of delivery.

Carbon emission tracking.

When it comes to sustainability, the very foundation of any initiative starts with a proper understanding of sources of emissions. Based on that, a company can then accurately categorize and measure the carbon emissions across its supply chain. Carbon emissions can be broken down into 3 categories:

Scope 1: Direct emissions from company owned and controlled assets such as different facilities

Scope 2: Indirect emissions from purchased resources such as energy or utilities

Scope 3: Emissions that are related to a company's operations. This includes the entire supply chain (including both upstream and downstream supply chain partners), as well as emissions from essential business travels.[10]

TOTAL COMPANY EMISSIONS

Scope 1&2

10%
from assets you control

60%
SUPPLY CHAIN

30%
other emissions from assets you don't control
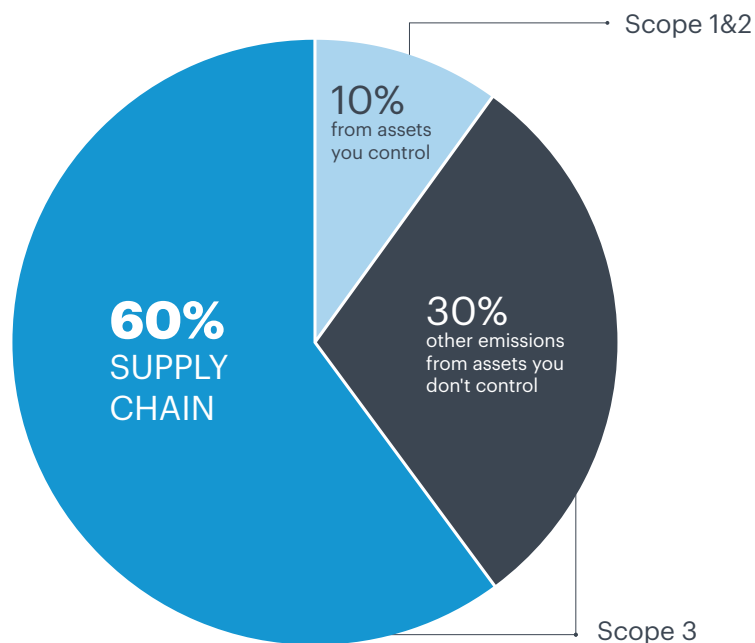
Scope 3

[10.] P44 Sustainability

While many organizations target the scope 1 emission within their own operations, up to 90% of the overall emissions that come from supply chain and essential business operations are often overlooked. To target those 90% scope 3 emissions, organizations need enhanced CO_2 tracking capabilities and supply chain transparencies. To achieve this, SAP TM categorizes all transportation activities into different modes of transport, such as ocean, rail, and road. In creating each mode, users are given the ability to define the unique sustainability factor for that mode of transport. This enables users to have instant access to CO_2 emission estimate for each transportation decision.

Scope 3 emissions are notoriously known for representing a significant portion of the global emissions. However, the biggest challenge that many organizations face in tackling this issue is the accuracy and accessibility of its measuring data.

Project44, a world class supply chain sustainability and visibility solution platform, is uniquely positioned to solve this problem given their large network of data integrations with carriers and logistics service providers (LSPs). Following a similar journey that brought project44 to be an industry leading real-time visibility provider, project44 can provide high-fidelity, Scope 3 emissions data and workflows companies need to effectively measure, track, and reduce their global supply chain emissions.

At Westernacher Consulting, we pride ourselves as being the pioneer in sustainable practices and we are proud to announce that we have gone completely carbon neutral as of Q1 2022. Westernacher has also developed a carbon footprint monitor that connects to SAP through SAP Analytics Cloud. This allows for feeding of emission sources directly into the application and intelligent insights to understand what the drivers for emissions are. This enhanced level of transparency is recorded and analyzed on a time series model, allowing users to keep track of carbon emissions performance overtime to better understand the effectiveness of its sustainability initiatives in reaching carbon neutrality. Any remaining emissions that cannot be reduced right now are shown and actions can be taken to offset them.
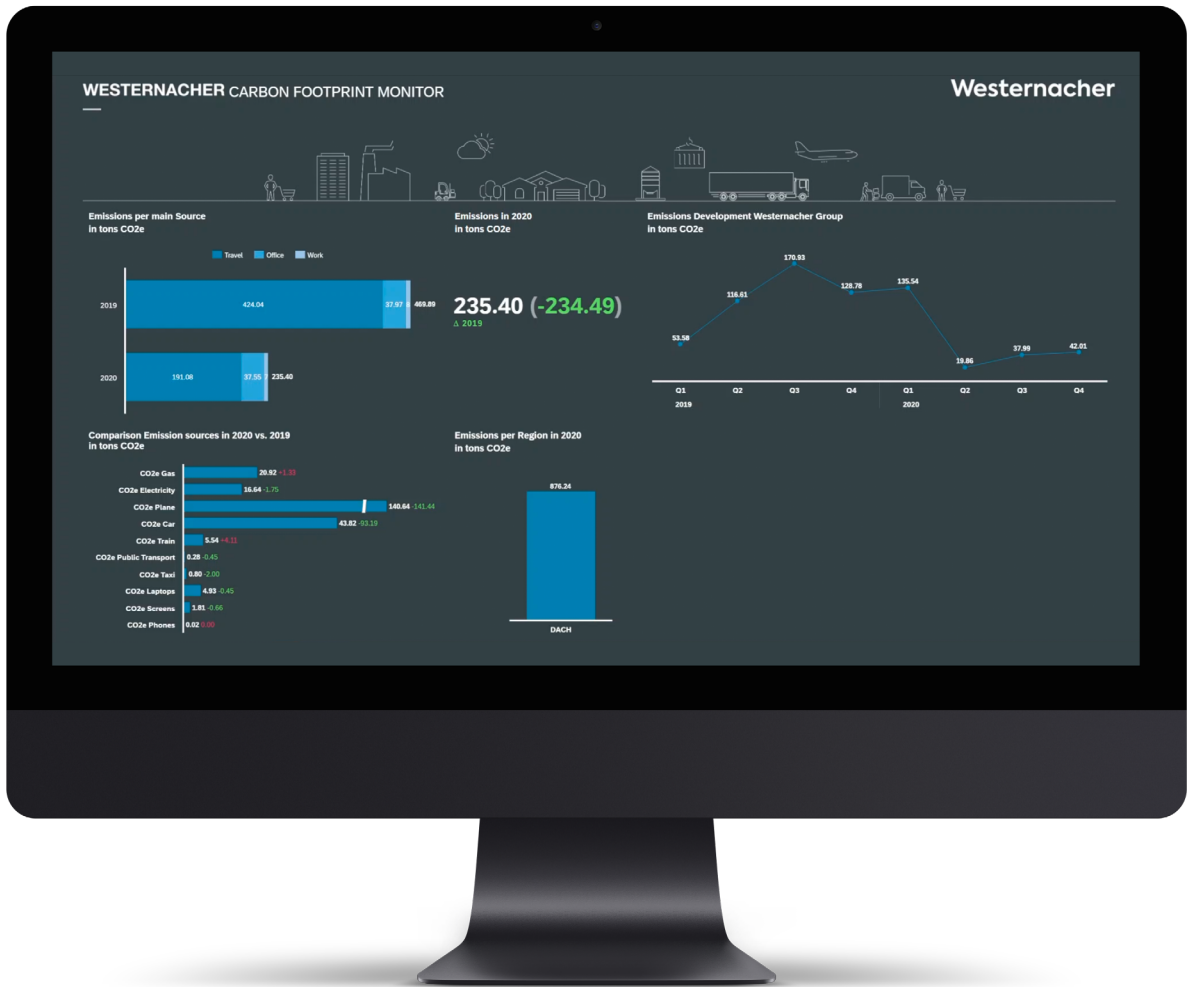
In addition, in SAP TM, users have the capability to consolidate either automatically or manually – allowing as many orders as the business requires within the same container. The result is accurate and responsible CO_2 measuring and tracing capability down to a single package throughout its supply chain journey, further simplifying the decision-making process. There are many other potential usages for this capability as well. For example, when combining with blockchain technology, this will drastically improve the carbon tracking of a product and supply chain transparency for the consumers.

* SAP has a unique module called Sustainability Control Tower (SCT). It measures sustainability in a more dynamic scope incorporating material selection, procurement, human resources, etc. This will allow users to effectively drill down each product and its components for an accurate measurement across your supply chain. To find out more, please talk to our experts at Westernacher to get an in-depth review of the solution.

Summary.

The pandemic has pushed many businesses to invest in a more efficient, agile, and sustainable supply chain to embrace the change in consumer expectation as well as the rising challenges in supply chain. In fact, businesses that are investing in SAP TM are seeing results of up to 30% in annual freight cost reduction.[11] This cost reduction means less equipment, maintenance, insurance premiums, fuel consumption, labor costs, and more importantly, an increase in consumer value-add through new capabilities made possible through sustainability enabling software (i.e., visibility) and trade off unused emission cap as commodity for strengthened financial performance for shareholders' benefit. SAP TM can not only help you automate certain tasks to allow you to rapidly scale up your business, but also do it in a sustainable way.

At Westernacher, we realize that each business is unique. We also understand that processes vary even within the same organization across various locations. With the increasing complexity of modern-day omni-channel supply chain, it requires an experienced supply chain partner to support this transformation. With our experience in assisting organizations across the globe implementing SAP solutions, we are equipped with experiences, industries leading practices, as well as the technical expertise to drive a successful implementation.

Journey of a thousand steps starts in a single step. Let us help you transform your supply chain to become more competitive, more agile, and more sustainable in future years to come. Talk to Westernacher today to understand how you can scale green.

[11] https://d.dam.sap.com/a/3yCVWJe/66000_BTS_66000_enUS.pdf

Start your digital transformation with Westernacher.

Westernacher has been innovating business and IT for more than 50 years. We are successful in helping our customers with many different transformation initiatives by providing solutions for operational, organizational and technical issues:

- **Technical:** from implementing EWM, S/4HANA, SCE and other SAP solutions to developing custom ABAP and Fiori solutions.

- **Organizational:** supporting businesses in the transformation to becoming a merchandise-focused retail organization. Providing an engaging vision and training to realize quick wins and removing (cultural) barriers.

- **Operational:** developing innovative business processes to make the most of the new technology and information. Improving KPIs and creating KPPs to move the company from a reactive stage to an orchestrating stage.

To provide you with a better understanding, we offer an Inspiration Day, where we show you what a digital supply chain looks like and how it might impact your company. This is achieved through demonstrations and by sharing customer examples.

Yuwen Wang
SAP TM Consultant
MU Americas
Westernacher Consulting
yuwen.wang@westernacher.com

United States
Westernacher & Partner Consulting Inc.
8 Grove Street, Suite 200
Wellesley, MA 02482, USA
P +1 781 283 5777
E info@westernacher.com

Global Headquarters
Westernacher Consulting GmbH
Im Schuhmachergewann 6
69123 Heidelberg, Germany
P +49 6221 187 62 – 0
F +49 6221 187 62 – 11
E info@westernacher.com

www.westernacher.com