THE ERA OF **SUSTAINABLE**

L⦿GISTICS

LEVERAGING DIGITALIZATION
& SMART SOLUTIONS

ZONE 4 DIGEST
DIGITALIZATION

A condensed look at how we connect data in the digital world with emissions reductions in the real world as explored at the Era of Sustainable Logistics Global Summit.

BRIDGING THE GAP

HOW DATA AND CONNECTIVITY CAN DELIVER SUSTAINABILITY

The latest technologies have opened up new opportunities to harness the power of big data collection and analytics to optimize supply chains and reduce emissions. But the sheer volume of data alone will not deliver sustainable solutions. How can companies bridge the gap between data and actionable insights?

The answer is by developing a sound strategy based on three key questions: What data do I need and why? How can I collect and consolidate data? And what can I optimize with this data?

In the following pages, we examine why data is crucial for sustainability, outline the challenges companies face, and explore how to put data to work for supply chain optimization.

WHY DATA IS MISSION CRITICAL
BETTER DATA. BETTER DECISIONS.

The WEF estimates that digital technology could deliver one-fifth of the emission cuts needed to achieve net zero by 2050 in the three highest-emitting sectors: energy, materials, and mobility.[1] That's because the data, software, and connectivity that make up digital networks can unlock efficiency gains in any sector, allowing companies to save resources, lower costs, and improve profitability. Digital tools will enable us to create smart workplaces and supply chains that minimize energy consumption, emissions, and waste.

Collecting and analyzing data allows us to understand our carbon footprint and identify the best ways to optimize our business. The information and insights guide investments, simplify reporting and compliance, and provide transparency and credibility.

It all starts with visibility, and visibility requires data. For example, sensors can monitor and measure operations at critical nodes in the value chain, while connected software can track and analyze the data collected. That's IoT at work, and it's transforming warehousing and supply chain management. Add cloud-based solutions, blockchain platforms, and AI, and digital supply chains go well beyond analysis and diagnostics to become predictive and even prescriptive. These technologies also allow tracking of Scope 1, 2, and 3 emissions – and no company will achieve net zero unless they consolidate data from all three.

Ultimately, better data means better decisions. Connecting data to processes and systems builds the necessary bridge to more efficient and sustainable operations.

COLLECTION + ANALYTICS = ACTIONABLE INSIGHTS

20%
Digital solutions could deliver one-fifth of the emissions cuts needed to achieve net zero by 2050 in the highest-emitting industries[2]

+20%
Leveraging machine-generated data better can improve material resource efficiency by up to one-fifth[3]

30+
Data-driven solutions identified by the WEF for companies pursuing sustainability outcomes across efficiency, circularity and Scope 3 emissions reduction[4]

> *The internet has helped move the world to more freedom, transparency, and democracy. It's only natural that it moves to a clean energy revolution that will last for generations to come.*

Kumi Naidoo
Former Executive Director of Greenpeace International

THE CHALLENGES
YOU CANNOT MANAGE WHAT YOU CANNOT MEASURE

Without metrics, management is mere guesswork. But once you have visibility, the challenge is consolidating your data and understanding how to use it to reduce emissions in your supply chain. Technology is the key enabler.

Four main clusters of digital technologies harbor enormous potential to cut emissions: functional technologies like big data analytics, decision-making technologies like digital twins, sensor technologies like IoT, and enabling technologies like the cloud. The challenge is putting these technologies to work for you and tapping into that potential.

Once you've pooled your data and know how to analyze it, deciding what to do with it isn't so straightforward. There are many ways to apply these technologies along the value chain to unlock sustainability solutions. Essentially, you can use your data to tackle three overarching challenges: Calculating and reporting emissions, building decarbonization strategies and governance processes, and running advanced analytics to develop optimization initiatives.

DATA-DRIVEN SOLUTIONS TO DECARBONIZATION CHALLENGES

Calculating & Reporting
- Calculate Scope 1, 2, and 3 emissions
- Report emissions and procure offsets
- Provide transparency and ensure credibility

Strategy & Governance
- Model decarbonization scenarios and cost curves
- Develop a decarbonization strategy and roadmap
- Incorporate targets into strategic decisions and governance

Analytics & Initiatives
- Calculate real-time emissions at specific points in the supply chain
- Build digital twins to aggregate operations and emissions data
- Develop specific optimization initiatives at particular points in the supply chain

DATA UNLOCKS SUSTAINABILITY
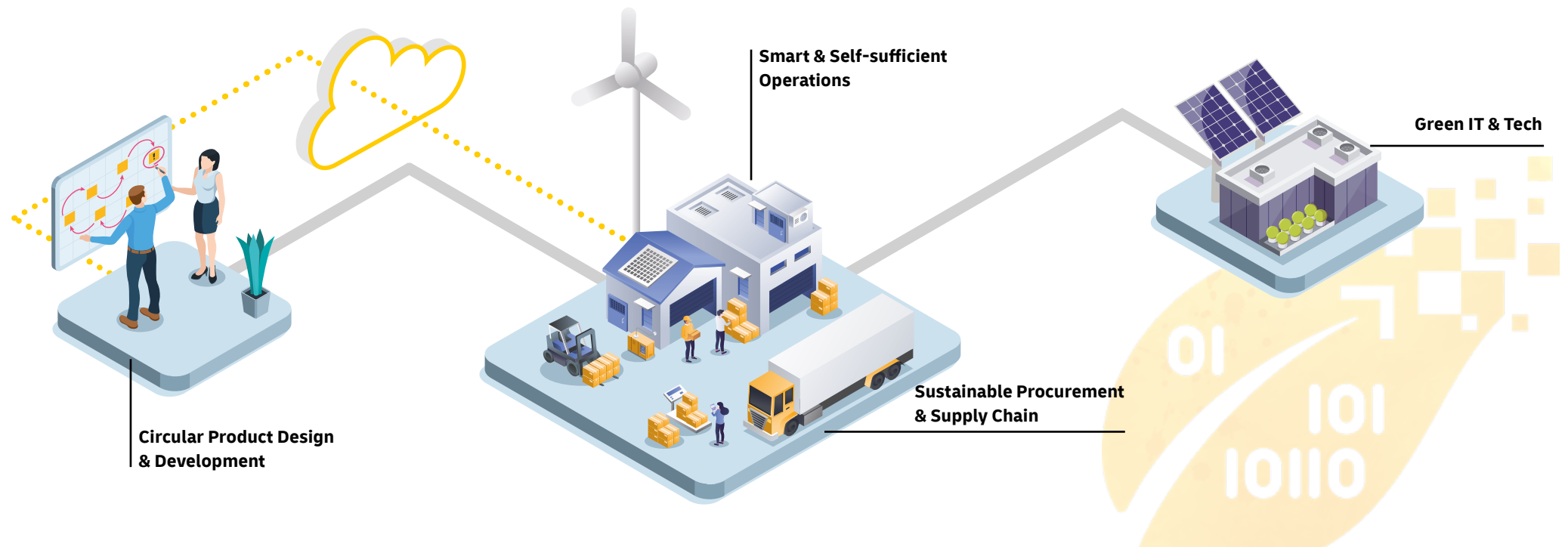
THE DATA-DRIVEN VALUE CHAIN OF THE FUTURE

Across all sectors, digital technology will allow companies to track progress and implement change. In the energy sector, for example, next-generation digital networks can monitor the performance of individual wind turbines and solar panels in real time to predict maintenance requirements, improve productivity, and optimize energy delivery based on need. In agriculture, leveraging data can increase yields by determining the optimal use of water

and fertilizers while factoring in weather forecasts and current soil conditions.

Data will unlock solutions to reduce carbon emissions while driving progress: sustainable products and R&D, resilient and sustainable supply chains, smart and self-sufficient facilities, and low-energy and low-cost IT. The impact will be felt across the entire value chain.

SUSTAINABILITY ACROSS THE ENTIRE VALUE CHAIN
Data and cloud connectivity hold the key

Smart & Self-sufficient Operations

Green IT & Tech

Circular Product Design & Development

Sustainable Procurement & Supply Chain

COLLECTING AND CONSOLIDATING
SOURCING ACCURATE DATA YOU CAN USE

THE PATHWAY TO NET ZERO
is in the cloud

8x
Expertise in cloud technologies can boost productivity eightfold.

75%
Three-quarters of cloud value comes from innovation, including faster development cycles and the easier adoption of technology.

>85%
Cloud-based solutions can increase energy efficiency by over 85% and lower costs by up to 50%.

Source: McKinsey

Securing precise emissions data is a multi-source endeavor, integrating internal databases, publicly available data points, and external provider information. Relying on a single source could lead to incomplete analytics. Internal data might be readily available, but it represents just a fraction of what's needed. While public data may be economical, collecting it requires a significant time investment. Purchased data from specialized providers incurs higher costs but offers comprehensive information on specific topics.

Repositories known as 'data lakes' are crucial to consolidating this data for analytics and reporting because they enable large volumes of structured and unstructured data to be stored in native formats. This centralized library ensures all data is accessible to all functions for targeted analysis and tailored reporting.

Technology plays a pivotal role in data collection and consolidation. For example, cloud-based applications create transparency by connecting all aspects of an enterprise. Similarly, the strategic deployment of IoT devices provides real-time insight into a range of metrics, from vehicle location and inventory levels to shipment temperature and ambient conditions.

PUTTING YOUR DATA TO WORK
THE DATA-DRIVEN WAREHOUSE

Today's state-of-the-art warehouses are smart facilities that harness data to optimize operational efficiency. Modern warehouse management systems leverage IoT technology for end-to-end visibility and integrate robotics to automate repetitive or physically demanding tasks, freeing up human hands for more complex, value-adding responsibilities. Data-driven warehouses also utilize predictive modeling to optimize workflows and make accurate predictions. Backed by emissions data, modern facilities can also be equipped with the required solar panels and other energy-saving technologies to make them carbon neutral.

Big data analytics today is so powerful that it can even be used to cut the carbon footprint of a supply chain in half despite the integration of an additional warehouse! Decision-makers can now look beyond traditional factors like costs or transit times and see the environmental benefits of multi-hub operations.

1 + 1 = ½
CAN AN ADDITIONAL WAREHOUSE CUT YOUR CARBON FOOTPRINT IN HALF?

A single-hub operation in the US experiencing high demand and increasing costs wanted to improve efficiency to prepare for expected future growth.

By collecting baseline data and modeling the existing network, we were able to analyze future scenarios and recommend an optimal network setup that included opening a second warehouse in East Asia.

The result was reduced logistics costs, inventory, and carbon emissions – and improved service levels and agility.

Source: Real data from semi-conductor customer
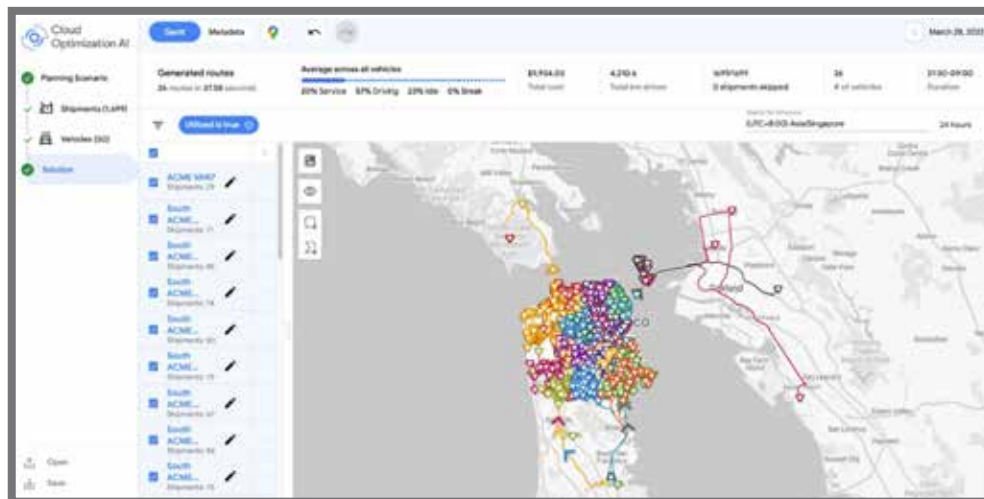

Before

After

-23%
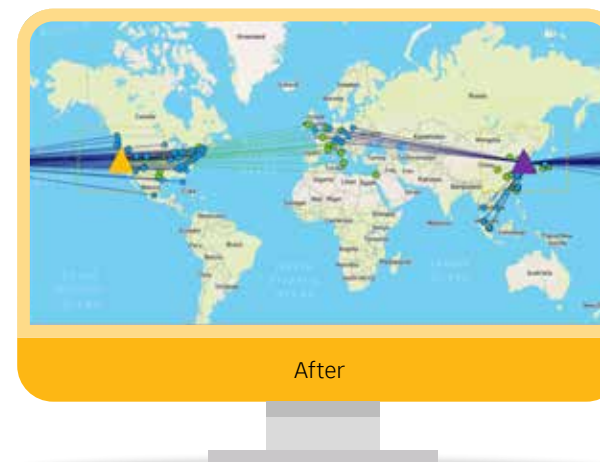
= CO_2 -52%

-83%

PUTTING YOUR DATA TO WORK

EFFICIENT AND SUSTAINABLE ROUTE PLANNING

State-of-the-art route optimization integrates data and algorithms to calculate the best routes in real time. Dynamic planning like this can make all the difference, especially in last-mile logistics. The latest solutions can account for individual delivery time windows for each shipment alongside time-of-day and street-specific variables. Features include recommended optimal starting times and contingency planning for unexpected traffic or incomplete data. This leads to shorter distances, fewer tours, and lower emissions.

What's more, these systems can estimate carbon footprint by vehicle type and usage, identifying where optimization could make the greatest impact.

Route optimization is not only for the road. The Port of Rotterdam leverages a sophisticated route optimization system to offer low-emissions options for ships entering the harbor. Integrating time-of-day, berth location, speed, and other factors makes it possible to calculate a green arrival option that approaching vessels can select to reduce their carbon footprint.

Google Cloud Fleet Routing
Near-real-time optimization to navigate last mile & reduce emissions

Cisco & Port of Rotterdam
Digital twin solution harnesses IoT to offer green arrival and reduce emissions

PUTTING YOUR DATA TO WORK

OPTIMIZED TRANSPORT MODE AND MULTIMODAL SOLUTIONS

Big data analytics can unveil patterns and insights that are not immediately apparent. For instance, analyzing historical shipping data, weather patterns, and traffic trends can yield optimized routes and modes of transport. This means finding not only the shortest path but also the one that avoids congestion and potential delays, ensuring shipments move swiftly while minimizing fuel consumption and emissions. At a more granular level, the data can determine the best mode of transport for an individual shipment based on its size, destination, and urgency to match needs with the most sustainable option available. This is especially beneficial for less-than-truck-load shipments, where optimizing space and weight in shared transportation can significantly reduce emissions.

Analytics can also assess the carbon footprint of different options, opening opportunities to switch to more efficient modes of transport. For instance, if cargo is predominantly moved by road, we might find that rail or sea, which typically have lower emissions per ton-mile, could be viable alternatives for certain legs of the journey. A shift from air to ocean freight can offer big savings on transcontinental routes. The data may also reveal that combining modes, a practice known as multi-modal transport, can offer the most sustainable approach without sacrificing efficiency. Leveraging data empowers informed, data-driven decisions that align with sustainability goals.
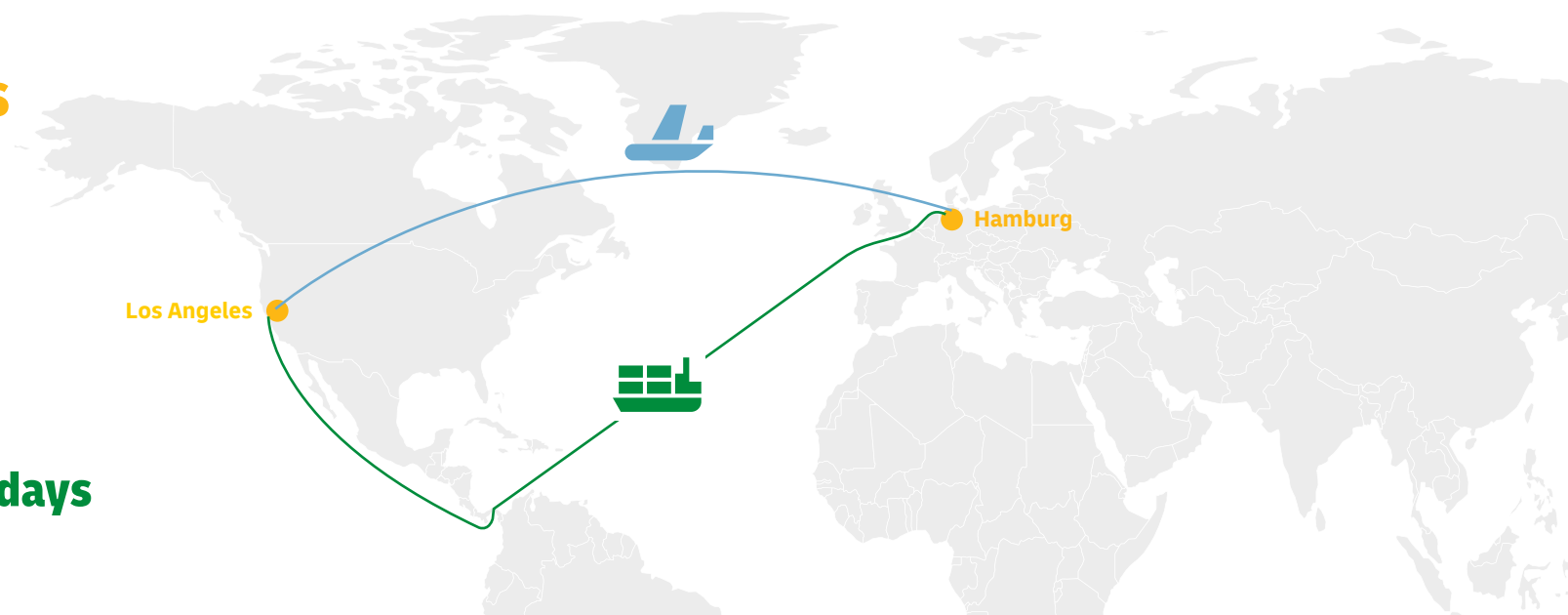
SHIFTING INTO SAVINGS

If you plan ahead, and time allows, switching from air to ocean freight can lower emissions considerably.

3018kg CO$_2$e

178kg CO$_2$e

-95%   **+ 31 days**

Los Angeles   Hamburg

PUTTING YOUR DATA TO WORK
SUSTAINABLE SUPPLY CHAINS THAT SELL

Data can help us do things never before conceived – or solve problems few knew existed. Case in point: Google recently worked with the airline industry to use AI and satellite imagery to reduce the warming effects of contrails.[5] If you ask yourself what contrails are, they are these thin, white lines sometimes seen behind planes that have a surprisingly large impact on the climate, accounting for roughly 35% of aviation's impact on global warming.[6]

Now imagine the impact of data on something much more tangible, like a bottle of wine. What if we could scan a QR code on the label to find out the carbon footprint of that individual bottle? The emissions would include everything from growing and harvesting the grapes to manufacturing the bottle to getting it on the store shelf – and every bit of the value chain in between.

This scenario is possible with today's technology, and it represents the pinnacle of putting data to work for sustainability. The example shown here is a working prototype developed by SAP and Symington that was on display at the Era of Sustainable Logistics Global Summit. Harnessing the power of data not only minimizes a company's carbon footprint, but it also allows them to turn sustainability into a selling point, offering consumers the ultimate choice.

UNCORKING SUSTAINABILITY
With today's technology, it is possible to accurately measure the carbon footprint of a single bottle of wine.

KEY TAKEAWAYS

LEVERAGING DATA AND CONNECTIVITY TO DELIVER SUSTAINABILITY

You cannot manage what you cannot measure

Without a clear picture of your carbon footprint, it's impossible to optimize the supply chain and make any meaningful progress toward sustainability.

Your data is a rich, untapped resource

A solid data strategy utilizing state-of-the-art collection and analytics will yield strategic, actionable insights for optimization.

Digital delivers

Technologies such as IoT, cloud, and blockchain can translate directly into operational efficiencies and bridge the gap to real-world impact.

Sources

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