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Tech-enabled sustainability

The digital path to sustainability and net zero

Decarbonisation, circular economy, supply chain transparency: Today, businesses are facing a broad range of urgent sustainability imperatives. The complexity of related issues, processes and measures represents a significant challenge. Tackling it effectively requires technology: ESG data, digital capabilities and innovative architectures help organisations to orchestrate the green and social transformation in a holistic way.

Now is the time for sustainability action. Companies across all sectors urgently need to step up their climate-related efforts, build responsible supply chains, seek new ways of financing the sustainable transformation and improve overall transparency and disclosure towards target progression. Increasing stakeholder pressure leaves no other choice, as customers, partners, regulators and investors focus more and more on sustainability in all three E, S & G dimensions. But how to address this enormously complex task? The way forward for organisations is to connect the mega-trend sustainability with the other overarching mega-trend of our era, digitalisation. High quality ESG Data and intelligent technology approaches are key to understanding, designing, implementing, monitoring and improving sustainability measures. A new software category of "ESG Solutions" for various areas such as carbon accounting, automated risk tracking, supplier traceability or ESG reporting and steering, is rapidly evolving.

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It is challenging to keep track of all developments and approaches in the vibrant area, but at the same time it is exactly these promising and new digital approaches that help to solve the biggest challenges.

While many companies have recognized the possibilities of digital ESG projects, the true potential of innovative methods such as advanced analytics for holistic steering and management, artificial intelligence to optimise energy usage or blockchain to trace materials throughout the value chain is at its very infancy. To increase the maturity and to leverage the full potential of technology for ESG it is necessary for companies to introduce holistic ESG data management strategy and a corresponding ESG IT architecture.

As this Point of View will argue, individual technology use cases are extremely helpful, however they should at the same time be integrated within a holistic ESG IT architecture and become a core elements of an organisation's IT Strategy. After an outline of sustainability technology imperatives, architecture aspects and use cases, tech-enabled decarbonisation in the automotive value chain will be discussed in more detail. This will be followed by a closer look at implementation approaches and useful tools. Obviously, the actual transformation roadmap will then depend on an organisation's individual situation.

Data and technology as sustainability drivers

When discussing technology and sustainability, it is important to introduce the general distinction between sustainable technology such as renewable energy generation solutions or e-mobility on the one hand which we can broadly categorise as "hardware", and digital tools and enablers that help organisation to gain insights and manage the transformation along the various ESG dimensions which is "software". It is the "software" aspect that will be addressed in the following pages, focusing on the sustainability potential of data-driven approaches. Companies may adopt these across a range of areas and themes: In the "E dimension" (environment: net zero etc), the "S dimension" (social: human rights, supply chain risks etc) as well as in the "G dimension" (governance: ESG management and steering, compliance etc), digital technologies represent a fundamental driver for analysing and understanding sustainability performance, identify measures and steer their implementation. In this context, the regulatory aspect is critical, as rapidly evolving disclosure regulations such as the CSRD (Corporate Sustainability Reporting Directive), the EU Taxonomy or the German Supply Chain Act (LkSG) require organisations to develop higher quality data, management, and reporting systems. Overarching net zero targets translate into a heightened need for carbon emissions insight, monitoring, and optimisation. Sustainability will have to be embedded in products and services design, and hence in respective development, operational and service processes. In addition, sustainable performance management should make use of data-driven decision making, balancing risk, cost and opportunity in order to ensure the sustainability transformation's effectivity.

The foundation for this agenda is formed by high quality ESG data with the necessary degree of granularity: accurate, assured, and actionable. The existing IT landscape of an organisation should be leveraged and optimised to help with the digital sustainability transformation. For new or ongoing IT transformation programs to deliver ESG benefits and capabilities, relevant demands need to be addressed early, and integrated with a strategic view: track measures and goals in real time; create transparency along the value chain; select, gather, and analyse the right data centrally; share data in the partner network; and anticipate potential implications of ESG activities on investor ratings.

One holistic ESG architecture

Addressing sustainability issues with digital technology requires action on two levels: developing and deploying the right enablers for practical use cases and integrating every individual ESG effort in a harmonised company-wide IT architecture. The arsenal of individual technology use cases is vast and dynamically expanding in lockstep with general digital innovation. Strategically important tech capabilities include among others

- CO_2e footprint calculations, scientific setting of net zero targets and simulation of reduction pathways for company-wide decarbonisation efforts
- Physical climate risk analysis and assessment of appropriate adaption measures
- ESG risk tracking along the entire value chain
- Financing sustainably requires new digitally supported approaches (e.g. automated tax optimisation analysis, data-driven ESG due diligence)
- Finally, ESG data also informs innovative reporting systems (e.g. automated aggregation, real time reports)

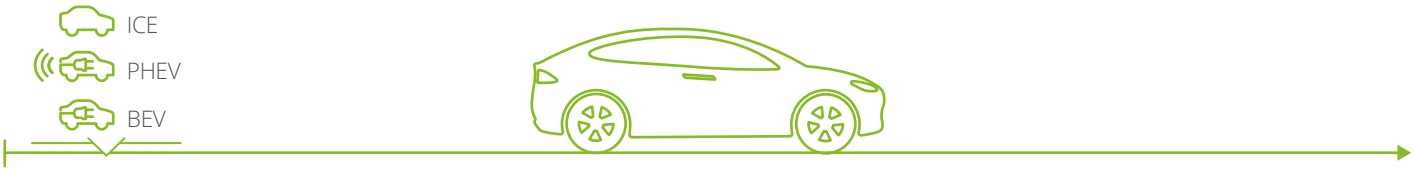
Looking at the bigger picture, these data-driven technology solutions have to be integrated in an encompassing IT and data architecture. That in turn requires organisations to implement various building blocks. ESG approaches need to address comprehensive data collection capabilities and identify the upfront need of data sharing needs with business partners, investors, and regulators. In addition to a comprehensive ESG data management, organisations need to develop ESG measurement and management capabilities along all applicable ESG dimensions. Further architectural building blocks are deep integration possibilities across core functions, processes, and operational decision-making systems. Considering that the IT infrastructure itself is also a significant contributor to CO_2e emissions, the management of the entire IT landscape with a focus on both the environmental and the social dimension becomes an imperative. There remains a lot of work to be done in the field of ESG technology: If we look at the current status quo of ESG data management and the technologies used, a very large part of the data is still collected in Excel files. The application of various ESG IT technologies is very disconnected and partially uncoordinated. **According to Deloitte research, 91 percent of companies currently work without specific system support, and 32 are thinking about professionalizing their data approaches.**

Sustainability tech in practice: Decarbonising the automotive value chain

The range of available digital sustainability technology is impressive. The practical question is how to orchestrate individual enablers along the value chain. For more granular insights, Deloitte's sustainability experience in the automotive sector provides instructive examples.

The complex automotive value chain offers sustainability potential across all segments, starting with raw material extraction (e.g. track-and-trace, working conditions insights). Greenhouse gas emissions need to be calculated for the entire value chain, and then individual initiative started to address reduction measures. This will range from production optimisation at suppliers, reduction of inbound and outbound transport emissions, review of the OEM´s product portfolio and production as well as areas such as fuel management, vehicle sharing concepts and other options to improve the CO_2 profile during the use phase.

Fig. 1 – Integration of S&C Technologies in the Automotive Value Chain
In the automotive value chain, we are pursuing the integration of sustainable technology assets to leverage the potential to achieve climate goals



Value Chain

Pre-chains Material extraction	Production at the supplier	Inbound Transport	Group Production	Outbound Transport	Use incl. fuel supply	Utilization
Deloitte's Decarbonisation Tool Greenlight: Carbon Footprinting (Scope 1, 2 & 3) and physical risk assessment, climate targets and decarbonisation roadmap as well as internal carbon pricing and steering						
IT Solutions for ...						
• Track-and trace of origin of raw materials • Increased Transparency of working conditions • ...	• Development of a ESG conform supplier assessment • Automated Review of contractual agreements within the supplier network • CO_2e emission calculation and assurance • ...	• Calculation of Logistic-emissions • Modeling simple visualization for default scenarios • Quality Management through sensor technology • ...	• Transparency into (non)-financial Data • Calculate and monitor emissions in production • Evaluation and comparison of the car portfolio in relation to ESG • ...	• ESG transparency for customers including delivery date • Calculate the most efficient way of transportation with lowest CO_2e footprints • ...	• Leverage sustainable ecosystems with fuel management • Develop more efficient processes through driver behavior data • ...	• Sustainable fleet management • Rental vehicle and car sharing concepts • Recommendations for a sustainability driving performance • ...
ESG Tools for ESG Performance Management, Steering and Reporting: Integrated, auditable and real time reporting to enable data based steering, performance management and external reporting						

According to the International Energy agency (IEA), road transport accounts for six gigatons of CO_2 emissions annually, which amounts to 15 percent. Among the many urgent sustainability areas, decarbonisation is therefore the most important issue for the automotive industry. While e-mobility, paired with green energy contracts, will help to reduce tail pipe emissions, further challenges on the path to net zero have to be addressed in both operations (scope 1 and 2 emissions) and supply of raw materials and components (scope 3 emissions). The complexity of supply chains introduces particular challenges as far as scope 3 emissions are concerned. The large number of tier-n suppliers with specific industry dynamics and increasing diversification result in a lack of transparency beyond tier 1. Insufficient data availability and quality as well as missing reporting lines further complicate the picture. At the same time, control measures beyond tier 1 are costly and difficult to implement. Organisations need to address the widespread lack of suppliers' ESG awareness coupled with legal concerns around control systems and an often less pronounced level of assertiveness in ESG monitoring and management on tier-n levels. The challenge is to understand, measure, manage and steer decarbonisation issues deep into the chain. Several fields of digital technology are relevant for achieving this in practice. Process digitalisation technology such as carbon accounting solutions facilitate carbon footprint calculation and data point accessibility. Deloitte's proprietary Decarb Solution, which will be discussed in more detail below, represents a useful tool building on footprint calculations. It helps clients to identify physical risk and derive decarbonisation pathways. Open data sharing networks increase transparency across the supply network and enable data-driven decision making. In the automotive industry, this approach is pursued by the international Catena-X sharing platform (catena: lat. "chain"). By introducing data standards and creating trust among partners, this network for the car industry will likely prove very effective for cross-company collaboration and provide a much wider data basis for analytics insights. Furthermore, supply chain governance solutions help with steering ESG across partner networks. At the same time, new ESG-related digital business models create new opportunities for the sector that can be realised with advanced technology approaches.

Holistic end-to-end perspective: Greenlight by Deloitte

A major success factor for automotive industry decarbonisation projects is the adoption of a holistic end-to-end approach. Deloitte experts have developed a modular solution that addresses specific client needs depending on the individual ESG maturity profile of the organisation.

Greenlight's end to end capability helps clients achieve consistent and accurate results when establishing their baselines, setting science-based targets, planning optimised abatement portfolios and reporting. Its modular format enables client-centered solutions tailored to varying goals and maturity and is powered by global libraries for tax/incentives, emission factors, benchmarking and abatement projects. It includes industry-level data and abatement roadmaps with the largest library of emissions factors (EF) in the industry including EFs developed by Deloitte with partners.

Greenlight is scalable. It enables clients to translate strategy into action with the enterprise grade systems and processes necessary for achieving these targets and abatement portfolios on an ongoing basis. Built on the Deloitte´s CortexAi platform, Greenlight enables API integration with other elements of a client's tech stack – offering interoperability with core ERPs, a cloud-agnostic approach, terabyte scale, and robust security. It also provides access to the AI capabilities of the CortexAi platform which enable clients to efficiently stand-up enterprise-level systems and processes for decarbonisation through seamless deployments with automated data ingestion, advanced data wrangling, and dynamic optimisation.

Clients are at the start of multi-year journey in a fast-changing marketplace. To help clients solve their hardest problems both now and in the future, Greenlight is more than just a technology solution but also a service that brings the scaled insights and expertise from across Deloitte into our technology-enabled approach. Greenlight is structured to constantly stay ahead of change with a variety of innovation initiatives including a sandbox to compare dynamic capabilities of market products, incorporation of advanced technologies in enhanced measurement, verification and reporting, and connections to innovation labs in hard tech and science that enable effective abatement pathways.

Implementing sustainable tech: Approach, assets, alliances

The practical implementation of net zero measures and other sustainability goals is a demanding task that requires a variety of technology solutions. For the climate efforts of our clients, Deloitte has developed Greenlight which provides a solution framework for IT tools required, including best of breed solutions from the ESG tech landscape. Further end-to-end solutions i.e. for building responsible value chains or managing disclosures will follow.

Collaboration and partnering in an ESG technology ecosystem will open-up new options in a particularly efficient and speedy way. Deloitte pursues a multi-dimensional strategy in this field. Experts develop proprietary assets such as dedicated decarbonisation accelerators, yet they also co-create solutions with partners or tap into existing partner tools and assets. The foundation for this approach is powered by strategic alliances with leading platforms, cloud companies and tech vendors such as SAP, Salesforce, ServiceNow, AWS and many others.

Transformative technology: Sustainability Deloitte Assets

Deloitte experts have developed a broad range of powerful proprietary sustainability assets. The Deloitte Greenlight solution has already been addressed above. The Carbon Analytics asset provides industrial companies such as automotive OEMs with a comprehensive simulation and optimisation solution. The asset supports manufacturers in optimising the carbon footprint of cars sold. Based on machine learning and cloud technology, Carbon Analytics helps with reporting and predicting CO_2 fleet emission relevant KPIs, and steering the business for optimal compliance with regulation and legal requirements. Deloitte's Sustainability Analytics Platform is also cloud-based. The solution consists of four modular sustainability components: Data, Services, Intelligence Engine and Insights. Both corporate and external data sources are used. The platform enables a broad variety of relevant use cases, among others carbon analytics, sustainable manufacturing, green digital twins and ESG sentiment analysis.

Making the green and social transformation a success

Sustainability and digitalization, the two mega-trends of our era, are intricately linked with each other. By putting state-of-the art digital technology to work for individual ESG goals, and at the same time making sure that IT itself is green and sustainable, organisations can achieve substantial progress towards their sustainability goals. While the necessary effort should not be underestimated, the benefits are more than worth it on a broad range of levels. Sustainability should not be limited to merely reacting to regulatory necessities. Instead, creating a sustainable value chain should be proactively embraced as an invaluable opportunity to improve the competitive position. Deloitte experts have seen the success of this approach across many projects. This broad experience also informed the creation of the Deloitte Marketplace Tech Centre. The centre connects expertise from multiple fields such as sustainability and climate, assets and alliances expertise, including emerging tech such as AI, IoT or blockchain. Deloitte as a global company itself strives to accelerate the path to carbon neutrality by 2030 and is using an advanced Net Zero technology from one of its key alliance partners.

The digital sustainability transformation: How to get started

Depending on individual client needs and their current stage in the sustainable transformation, Deloitte has developed dedicated advisory offerings to guide clients in their technology enabled ESG approach.

As a first step it is essential for companies to understand the potentials digitalization offers when aiming to achieve their sustainability targets. Based on individual ESG priority areas, companies should analyse the technological potential and data requirements. To gain the ability to define and achieve certain ESG data objectives, the individual situation of a client needs to be assessed. Deloitte supports clients in this journey with the ESG Digital Maturity Assessment. With the comprehensive analysis both the current maturity and the ambition of a client's IT infrastructure are considered. Existing data sources and their contribution to the ESG data objectives are scrutinised to build the basis for the definition of target picture.

The definition of this target picture is part of the second step companies need to take: The digitalization of the sustainability transformation has to be granularly designed and implemented. With the definition of data requirements regarding their quality, assurance level, and their usage a first building block for a comprehensive ESG Target Architecture is set up. With the support of sector specific ESG model architectures supports Deloitte clients in defining future IT and data landscapes. Based on the evaluated status quo (ESG Digital Maturity Assessment) and the defined target picture (ESG Target Architecture) a gap analysis is conducted followed by an ESG Tool Selection process. The latter aims to choose the most suitable software solution to address client specific needs. As we focus on an end-to-end approach when it comes to Technology for Sustainability not only the tool selection but also the Tool Implementation is supported.

While the design and implementation are the main focus of our clients today, is the shift to establish new solutions, structures and ecosystem just as important. The realization of the comprehensive ESG IT architecture aims to enable an accurate ESG data-based steering and performance management, leveraging the transparency about the sustainability of company activities. Another important sustainability dimension is the topic of IT infrastructure's own environmental footprint – Green IT. From production, through distribution, use and up to its end-of-life, IT has a substantial impact on the environment through greenhouse gas emissions, material use and waste production. Deloitte helps to identify levers in the IT product and service portfolio to reduce greenhouse emission as well as in the measurement of service and product owners in achieving reduction targets. To enable a holistic digital supported approach for ESG demands a well aligned approach and in many cases a multi-year roadmap is necessary.

Deloitte helps organisations to get started to understand, design, implement and establish a fully integrated digital and sustainable transformation.

Fig. 2 – Three steps to reach a digital sustainability transformation

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