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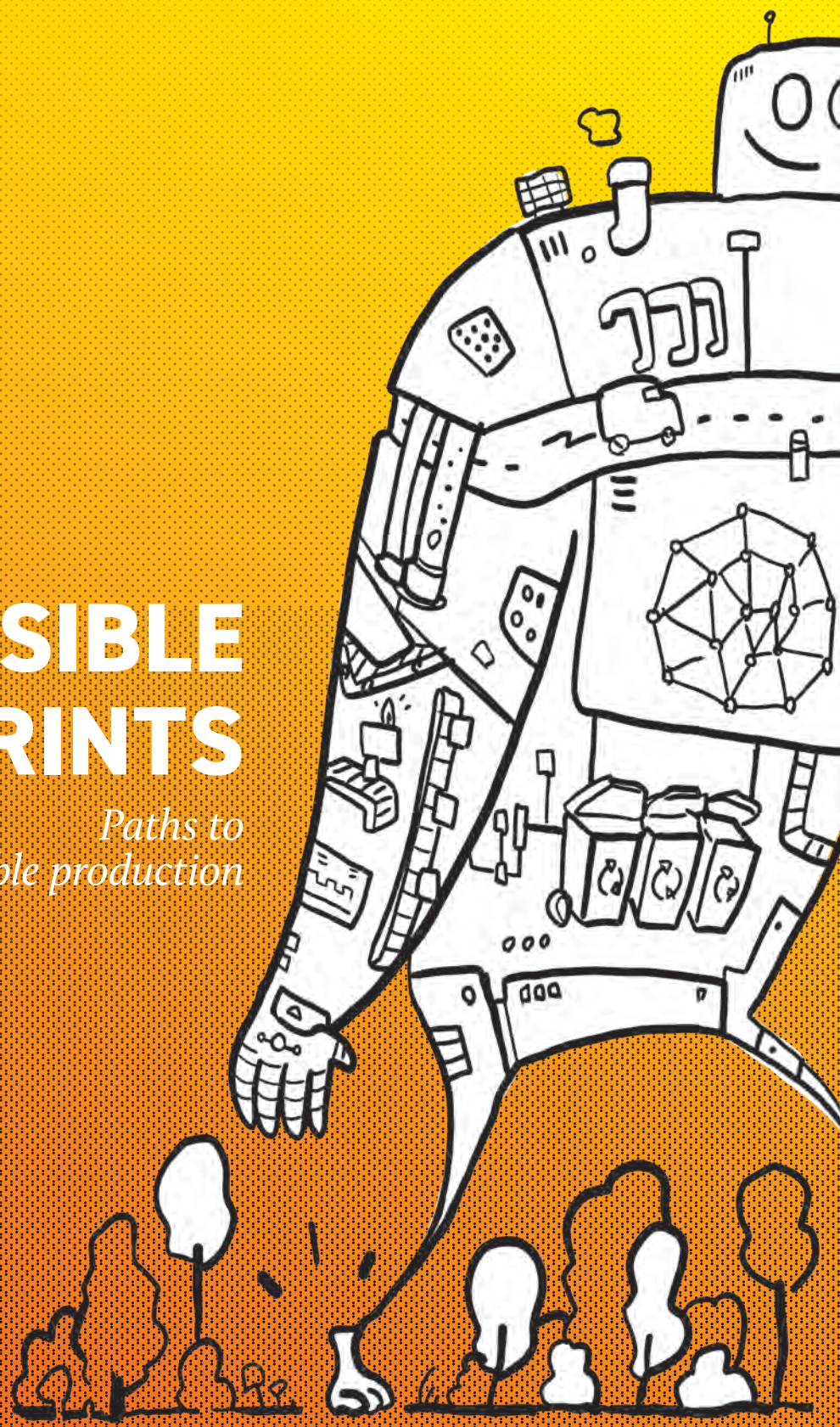
ROIDIALOG

INVISIBLE FOOTPRINTS

Paths to sustainable production



ROI-EFESO DIALOG ENGLISH EDITION 64_2021

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CONTENT
EDITION
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Hans-Georg Scheibe,
Member of the Board, ROI-EFESO

THE LITHIUM BUCKWHEAT DILEMMA

RECONCILING ECONOMY, ECOLOGY AND SOCIETY HAS NEVER BEEN EASY. THE STORY OF INDUSTRIALIZATION IS ALSO A STORY OF DESTRUCTION - AND SO FAR, A MATTER OF PRIORITIES.

source: unric.org

As in Nevada, for example, where a rare wildflower, the buckwheat of Tiehm, grows on a 10-hectare desert area in Esmeralda County - and only there. However, the same area is also home to a gigantic lithium boron deposit, the development of which could make an important contribution to the stability of the local value network for electric batteries.

Lithium or wildflower? Questions of values cannot be answered mathematically and are therefore strongly dependent on the respective current political or moral constellation. Therefore, there are two principal approaches today to address such questions at the societal level. The first approach is to price and sanction negative effects on the natural and social environment. However, there will always be someone who pays a high price.

The much better way is therefore to fundamentally reduce the number of such either-or questions using technological innovations, a smartly organized value chain and Industry 4.0 solutions.

This approach is prominently reflected in the 17 sustainability goals defined by the UN as part of the 2030 Agenda. These include, for example, "decent work and economic growth", "industry, innovation and infrastructure", "sustainability of consumption and production" and "climate protection measures".

In this issue of ROI DIALOG, we shine a spotlight on how industry is already helping to achieve these goals and show pragmatic approaches to greater resource efficiency, waste prevention and recyclable material cycles.

We will probably not be able to avoid every conflict between economy and ecology in the future. But we can already do a great deal to reduce the number and intensity of these conflicts today.

HOW TO SURVIVE A BLIZZARD OF CHANGE

THREE FIELDS OF ACTION FOR SUSTAINABILITY STRATEGIES

Tim Ballenberger, Sustainability Expert, ROI-EFESO

TAKE YOURSELF BACK TO THE EARLY 2000S FOR A MOMENT:

With Blackberry and iPod, you were way ahead technologically, ego googling was considered a popular sport, and in the company, the web presence and IT skills were suddenly highly strategic topics. Those who recognized the dawn of digitization then sometimes hired a few programmers in the hope that they were now optimally positioned for the future.

The focus on sustainable business promises to make a serious difference in our world.

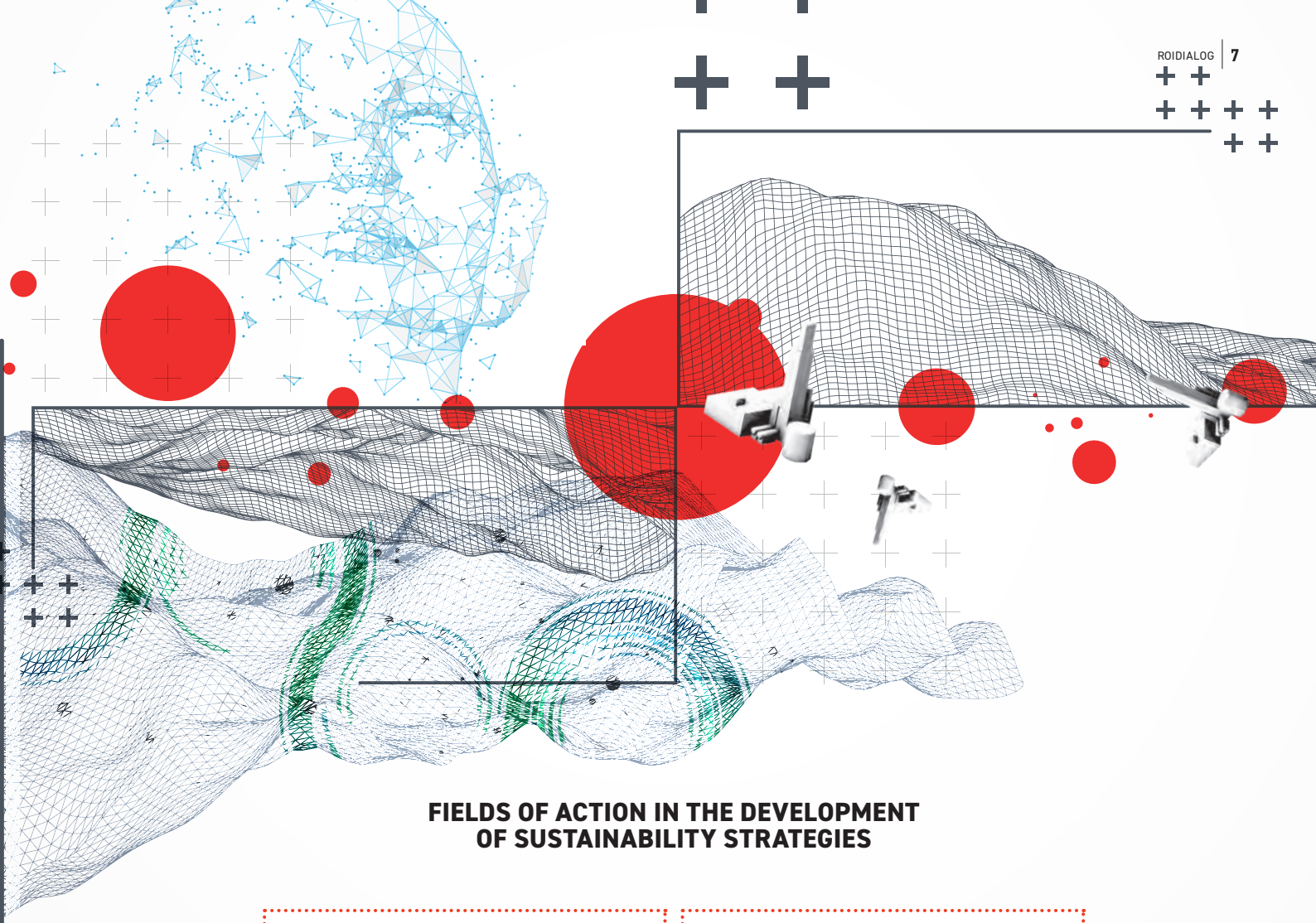
The situation is similar today when sustainability officers are tasked with reconciling economy, ecology and CSR in the "green" transformation of the company. That's a start, but of course it's not enough to do justice to the task. Like digitization, a focus on sustainable business promises to change our world in a serious way. And once again, many companies are reluctant to tackle the challenge that actually requires a radical realignment.

This is sometimes, since not every sustainability aspect has the same significance for every industry. Energy-intensive industries such as the chemical, steel or automotive industries, for example, have been dealing with issues such as CO_2 prices and costs for some time and have to make sustainability criteria transparent in their annual reports. Accordingly, they have a higher degree of maturity in the operational implementation of "green" strategies than companies that are still at the beginning of this development. And unlike in the past, Industry 4.0 technologies, in combination with lean management and operational excellence (OPEX) initiatives, can quickly deliver significant results in recycling, CO_2 reduction, or raw material savings.

PREPARING FOR A NEW WEATHER PATTERN: PREMISES FOR SUSTAINABILITY STRATEGIES

Where do manufacturing companies best start in the (further) development of their sustainability strategy in order to bring the complexity of the topic into a results-oriented structure? Here, there is a clear empirical value from our projects: First, you should get an overview of whether and how the topic is already anchored in the company. Only on this basis can you really assess whether measures can be implemented effectively. With our "Sustainability Assessment", we are looking at this from two angles: Firstly, via a "bottom-up" sustainability assessment of the value chain. Here we examine, for example, how product development, operations or supply chain management are positioned about global trends such as resource efficiency, circular economy or transparency.

On the other hand, a "top-down assessment" provides answers to two important questions: How important is sustainability in general within the company? How is it already considered and implemented in internal processes, for example on the basis of concrete KPI targets? This perspective quickly brings to light (improvement) options for sustainability initiatives. Experience shows that these initiatives can then be clustered and implemented in three fields of action (see Figure 1).



FIELDS OF ACTION IN THE DEVELOPMENT OF SUSTAINABILITY STRATEGIES

BUSINESS MODEL & SUSTAINABILITY STRATEGY

MANAGEMENT SYSTEM & STRATEGY IMPLEMENTATION

PRODUCTS, MARKETS & CUSTOMERS

BUSINESS MODEL & SUSTAINABILITY STRATEGY

In May 2021, a Dutch court caused a turning point in dealing with companies that have little motivation of their own for the topic of sustainability: It obliged the Royal Dutch Shell Group to emit only around 55% of the amount of CO_2 emitted in 2019 in 2030. This forces the company to change its business model and sends a clear signal to the industry that a rethink must take place in order to remain competitive. While the oil industry may be a special case - no company can assume that climate change or supply chain laws will not impact its own business model.

When integrating business model & sustainability strategy, the following starting points, among others, are helpful:

Use OPEX as a starting point!

Companies that have already reached a high level of maturity regarding OPEX should use this as a starting point for formulating and implementing their sustainability strategy. After all, OPEX measures are already aimed at increasing resource efficiency and reducing or avoiding waste of all kinds. Here, it is important to think beyond OPEX: Could my waste be a raw material for another company? Which existing key figures, e.g. on raw material and energy consumption, could be used to define sustainability KPIs?

Question your business model!

In addition to energy consumption and possible environmental impacts in production, the manufactured goods or the associated business model should also be scrutinized. Those who manufacture and sell machines today, for example, may generate more profit in the future through leasing models

in combination with services: The customer leases or rents the machine and pays for maintenance and optimization by the manufacturer.

In line with the closed-loop concept, this increases the useful life of the machine, improves the efficiency of its use, and ideally generates more profit for the manufacturer. Because if the manufacturer is also responsible for maintenance and optimization, it can in principle access the operating data of all machines in circulation - and thus implement maintenance and optimization better than an individual user of a machine could. This has a positive effect on the downtime of the machine and thus also a positive effect on the utilization time.

Share and network production capacities!

Another potential closely linked to a realignment of the business model is the utilization of production capacities. When orders fluctuate, lines are sometimes underutilized, leaving production capacities idle. Free capacities could therefore be sold to other manufacturers whose production has to cope with a surplus of orders.

Renting machines could be more profitable than selling them.

This would also allow production capacities to be optimized and used more efficiently on a macroeconomic level. However, this model is more suitable for companies that have a regional network and only short transport distances or expenses - otherwise the positive energy balance in machine utilization can quickly be offset by a "minus" in fuel consumption in logistics.

MANAGEMENT SYSTEM & STRATEGY IMPLEMENTATION

Regarding the field of action "Management system & strategy implementation", the first question is: Who is responsible for the topic of sustainability in the company - a staff unit or a member of the management? This influences the significance of sustainability initiatives and thus their impact on sustainability performance. However, it is also true that the more visible and transparent challenges and results are, the more relevant the topic is for C-level decision-makers. In this context, the following points, among others, should be considered:

Visualize and compare results!

The actual impact of sustainability measures in production and other areas can be measured using a system of key performance indicators. In addition to electricity and water consumption or CO_2 emissions, KPIs such as the number of occupational accidents and the proportion of women in the workforce or in management positions are also relevant for each site. Manufacturing companies should also relate the production-relevant KPIs to the quantity of products manufactured in order to quantify the environmental impact as a function of economic performance.

Ideally, the system will not only enable targets and comparisons at the site level, but also down to the functional or departmental level. Such benchmarking in turn plays a central role in incentivizing sustainability initiatives. In best practice cases, measures are also stored for the event that one deviates from one's goals or does not achieve the desired effect with the current approach.

Connect digitization and sustainability initiatives!

In the context of the aforementioned points, digitization brings two major benefits: first, an improvement in transparency at the operational level, because if you know the current consumption values and process flows of each machine precisely, you can improve them accordingly. Secondly, the complexity of the system resulting from the quantity of individual components can only be monitored, controlled, managed and ultimately optimized by digital solutions.

Further potential for improvement also quickly becomes apparent in other cases, such as more precise coordination of the machines with each other. If, for example, one machine requires heat while another provides it, this can be synchronized. Another advantage is to make the power requirements of the machines transparent. The data collected not only provides more precise information on power consumption, but can also be used to identify weak points, errors or failures in the system. If a machine consumes more power than normal, this can be an indication of wear and tear and thus provide a timely "warning signal" of a possible machine failure.

Lifecycle analyses visualize concrete goals and reduce complexity.

Use lifecycle analytics to make better decisions!

Does the installation of a photovoltaic system on the factory roof bring the optimal "green ROI"? Or are better results achievable if the company car fleet and all vans at the site are "electrified" instead? These and similar questions, which involve a high degree of complexity in implementation, can be answered with the help of life cycle analyses. These quantify, for example, the impact of the measures on CO_2 emissions over the next ten years and thus enable rapid decision-making for the ultimately more suitable measure.

PRODUCTS, MARKETS & CUSTOMERS

Another key area for action is sustainable product design. After all, the increasing demand for consumer goods can also be met with limited resources - provided they are used correctly, put into a recycling cycle or completely replaced by more suitable alternatives. When aligning sustainability strategies in this context, the following points of orientation are relevant, among others:

Develop "smart" products!

Whether it's a machine, a sneaker or a frozen pizza - for every product, it is possible to break down and change the resources used. However, the ecological footprint of the product is not only determined by the raw materials used, but also by the routes they

take - both in the manufacturer's supply chain and later at the end customer and in the disposal/recycling process. Switching to locally available raw materials or materials can therefore already have a significant impact on the sustainability balance in terms of CO_2 emissions. A "smart" product design takes these paths into account, among other things, but also how much energy must be used to manufacture the product.

Take a clear position in the market!

The clear focus of automotive manufacturers on the issue of sustainability is an example of the traction that such positioning has. Regardless of whether this is motivated by government requirements or economic interest - a commitment to CO_2 neutrality sends a clear signal to suppliers, partners and the end customer. Suppliers must expect to be questioned about their CO_2 reduction efforts - both by the client and by other stakeholders. The pressure to act and provide clear information quickly has the positive effect that sustainability issues are treated more consciously and with greater priority within the company.

Think in global terms!

Evaluating one's own product portfolio under sustainability criteria is an important step. But significantly more is possible if the global challenge of achieving climate targets is understood as a market with new opportunities. For example, what products can be developed to capture CO_2 from coal-fired power plants, store it and make it available to the economy in other materials? There is also great potential for energy storage for surplus renewable energy, as well as means of transport that run on green hydrogen, green ammonia or other e-fuels.

These fields of action provide an initial impression of what changes are possible and necessary in the company. Like digital transformation, it is important to avoid actionism. This means that attention, time and money should not be arbitrarily invested in many small projects across the board, but should first flow into targeted prioritization: Which areas in the company hold the greatest "levers" for CO_2 reduction? What measures will bring what results there in the short and long term? This can already alleviate the pressure to act in the short term with reduced emissions, a higher recycling rate or lower energy consumption.

The commitment to CO_2 neutrality sends a clear signal to suppliers, partners and the end customer.

Reduce operating costs, minimize C
Measures for a green balance

VALUE NETWORK

FACTORY

SYSTEM BOUNDARY

KEY ELEMENTS

GREENHOUSE GAS EMISSIONS

ENERGY PROCUREM

SIN

CRADLE TO CRADLE

SUPPLIER

Green Building & impervious coverage mitigation

Efficient machines and operating supplies

High-emission process substitution

CONSCIOUS EMPLOYEES

Trained

Empowered

DIGITALLY-ENABLED

Energy Management System

CUSTOMER

Proper waste treatment

Overall equipment effectiveness

Optimal machine and process parameters

CONT

SUCCESS FACTORS

MINDSET

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O_2 emissions:

	MATERIAL AND OPERATING SUPPLIES	WATER	BIODIVERSITY IM-PACT COMPENSATION

GLE PROJECTS

Thermal Insulation	Energy Storage & Thermal Networking	Demand Side Management	Flexible Production System

PRODUCTION

TRANSPARENCY

Consistent product track and trace

DIGITAL PRODUCTION CONTROL

Sustainability-focused production control

AI-enabled system control and optimization

Minimization of process losses & scrap	Renewable energy supply	Machine and equipment switch-off	Production to demand

INUOUS EFFORT

	ENERGY AND RESOURCE FLOW TRANSPARENCY	KPI BREAKDOWN

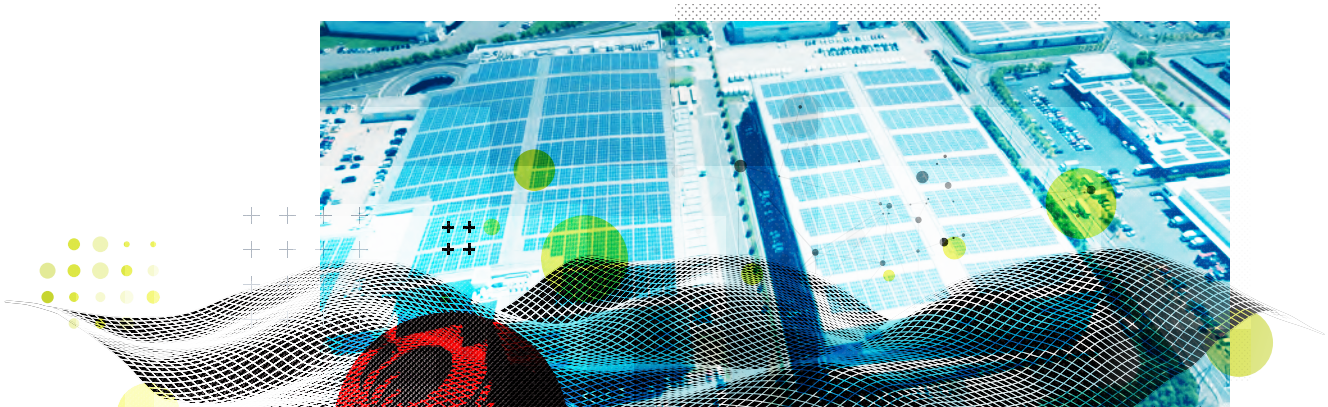
„THE INDULGENCE CERTIFICATES HAS

TRADE WITH
S NO FUTURE“

AN INTERVIEW WITH CHRISTIAN BORM, M. SC. , COORDINATOR OF THE "VDI FOCUS TOPIC 1.5°" AT THE VDI - ASSOCIATION OF GERMAN ENGINEERS, ABOUT ENERGY-FLEXIBLE FACTORIES AND GREEN VALUE NETWORKS.

Christian Borm,
coordinator of the "VDI Focus Topic 1.5°"
(Image: VDI e.V.)

The 1.5-degree target of the Paris Climate Agreement is the focus topic of the VDI (Association of German Engineers) in 2021. As part of the interdisciplinary VDI initiative "1.5° - Innovations. Energy. Climate. - Together for the Climate Goal", experts from the VDI specialist societies are available to companies as contacts. As an independent, technology-neutral association, the VDI aims to provide transparent information about solution paths and their advantages and disadvantages - for example, in questions of climate protection, the provision of electricity and heat, or mobility.



"A fair one Competition is essential for successful climate protection."

DIALOG: Mr. Borm, the representatives of the G7 countries were unable to agree on a concrete coal phase-out date in Cornwall, but they did agree on an infrastructure initiative to support developing countries. Will the focus of global climate policy be redefined?

CB: Not re-set, but re-examined. The concern of the infrastructure initiative is more important than ever for several reasons: First of all, the climate crisis is global and can only be solved globally. So investments in building a sustainable, functioning economy are necessary all over the world, especially after Covid-19. In addition, there is certainly a politically motivated connotation at the moment, namely to bring the G7 infrastructure initiative into play as a sustainable alternative to the Chinese New Silk Road project.

Thinking a bit further, however, there is another dimension at stake: namely, achieving equal, fair production conditions worldwide - but also from the perspective of the industrialized nations. As long as the product price is the measure of all things in global competition, companies in Europe will perhaps produce in a more climate-friendly way, but at higher costs than those companies that do not have to worry about environmental protection and transparent supply chains. In this context, the issue of "level playing field," i.e., ensuring equal and fair competitive conditions for all market participants, is therefore gaining renewed importance.

DIALOG: This will require stricter regulatory requirements, similar to those in Europe. Where should governments start in order to achieve a lot for climate protection in the short and long term?

CB: Clearly the expansion of renewable energies. This is the "raw material" that we need everywhere in the world for transformation in the energy system, including very particularly in Germany. If we can't use renewables across the board in this country, everything downstream won't make sense. Unless they are available somewhere on the world market just as "green".

"The transformation to The energy-flexible factory requires a redesign of the value-added processes."

DIALOG: What hurdles does German industry face in switching to renewable energies?

CB: As I said, this renewable energy must first be available in sufficient quantities. And not just on a balance sheet basis over the course of the year, but in the exact periods when it is also needed. Even if you buy "green" energy quantities on paper on the electricity market by terawatt hours, they will not necessarily be completely "green" in physical terms. So if you currently want to produce in Germany with a truly sustainable energy supply, you have to synchronize your plants with generation from photovoltaics, wind, hydropower or geothermal energy, or import energy from these sources from abroad via transmission grids.

The second major hurdle is then to optimize the manufacturing processes for this form of energy supply, i.e. , to create energy flexibility in the factory. This requires a whole series of sometimes more, sometimes less serious changes - for example, for energy storage, in the adjustment of machine occupancy, order sequencing, process starts, etc. In the VDI 5207 series of guidelines, we describe how to change your production accordingly so that these measures harmonize with each other.

DIALOG: Sounds like an extremely challenging task ...

CB: That's how it is. And we haven't even taken into account the fact that most productions pursue a continuous process for maximum utilization of their resources. This is fundamentally at odds with energy use, where decisions have to be made literally according to the weather, with ecological or economic weighting.

Even today, this is not yet possible without further ado. This is another key challenge that will have to be solved in the next few years: creating the digital interfaces and databases that companies can use to reliably find out exactly when this supply of renewable energies will be available at the desired price, so that they can plan their production accordingly. So in most cases, a transformation to an energy-flexible factory will require realigning the value creation processes.

"No real transformation is possible without the expansion of renewable energies."

DIALOG: But energy supply is only one aspect where companies can score points for their carbon footprint. Where can further potential be tapped?

CB: Best practice companies deal with at least three fields of action: Firstly, with a continuous further development of the energy supply with the aim of using 100% renewable energies. Secondly, with a control of externally purchased operating resources with the objective of achieving the lowest possible resource, energy and CO_2 footprint. Thirdly, with the further development of their supply chain management, ensuring up to the Tier 3 level that points one and two are shared and pursued together - this is the final stage, so to speak.

Some companies are already working very actively towards this third scope of being able to completely "green" themselves and their suppliers. This is exactly the right way to go - as opposed to purchasing certificates to compensate for gaps or shortcomings. This selling of indulgences is not sustainable, as it postpones the necessary changes in one's own company and supplier companies instead of dealing with them. There are residual emissions that, for

technical reasons, can only be offset by compensatory measures, but this illusion of sustainability, of wanting to solve all problems without other adjustments, helps no one.

> *"An illusion of Sustainability helps no one."*

DIALOG: What are the hallmarks of sustainable supply chain management?

CB: In general, you should ensure that your own manufacturing process has the smallest possible footprint. And then optimize the life cycle of the product so that it is as recyclable as possible at the end and the raw materials are returned to the cycle. Those who have so far placed a lot of emphasis on further developing cooperation with their suppliers in terms of costs, innovation and reliability will find it easier to additionally align this cooperation with sustainable management.

FROM THE CRADLE TO THE RESURRECTION

SUSTAINABILITY GOALS FOR THE PRODUCT LIFE CYCLE

Dr. Felix Canales, Senior Expert, ROI-EFESO

What actually makes a product "sustainable"? ROI-EFESO's "Product Life Cycle" approach classifies sustainability goals that can relate to physical products, software or services (see graphic page 22/23). The approach thus provides companies with a guidance framework to track these goals from the initial idea to recycling. Different focal points can be set in the four phases of the life cycle explained below.

IDEA GENERATION

What options are there to make an existing product even better in terms of sustainability criteria? Or even to develop a completely new one that meets a customer need and at the same time has a perfect sustainability footprint? Pooling and focusing creativity and resources on sustainable product ideas is perhaps the greatest challenge of this phase.

SUSTAINABILITY AS A DRIVER FOR INNOVATION

The first step is to examine the methodological and organizational prerequisites in the company that enable sustainable product ideas to emerge. Specifications make sustainability tangible in goals, measures and limits, especially via the basic, performance and enthusiasm characteristics of the product. For example, performance and consumption are usually directly linked not only in cars, but also in other products such as household appliances or machinery. These product requirements set the framework for subsequent development, but also represent a kind of interface between the company and its customers. Both sides can be drivers of innovation here - Volvo's decision to limit the power of its vehicles to 180 kilometers per hour and to say goodbye to eight- and six-cylinder engines, for example, had a corresponding signal effect. Such decisions realign the product portfolio and at the same time cleverly address customer perceptions of the brand.

Higher costs for more environmentally friendly materials can be communicated as added value for the customer.

ESTIMATE AMORTIZATION OF SUSTAINABILITY

Another key element of this phase is the "sustainability payback," which is determined by looking at customer benefits and pricing sustainability functionalities and by modeling business models. This calculation is different for each product. However, a cost-plus calculation that focuses on material input and direct manufacturing costs as central benchmarks is not sufficient to solve this task. How much more would customers pay, for example, if a vehicle or machine had to be serviced at longer intervals and the period of use extended? After all, in order to offer such added value, higher-quality components must be used, which make the product more expensive. Methods such as conjoint analysis, the lead user concept or product clinics are helpful in this context.

Specifications make sustainability tangible in goals, measures and boundaries.

EVALUATION OF THE ECO-INDUCED CUSTOMER EXPERIENCE

This is a crucial component of the customer benefit analysis, which simulates how the customer would experience the sustainability aspects themselves as well as the product as a whole. What changes, innovations and benefits are the focus here? Does the customer even notice the change? In this topic, the digital product dimension usually plays an important role. For example, anyone who can use an app to read how much electricity their photovoltaic system generates in real time and how much CO_2 it saves compared to other types of generation will experience this product completely differently than they would without such a tool.

DEVELOPMENT

Of course, not every sustainable idea proves suitable for the development phase. With test runs, pilot projects or market research tools, companies find their own variation of a "filter" that identifies promising approaches for further development. Once this is done, the focus is on the following topics.

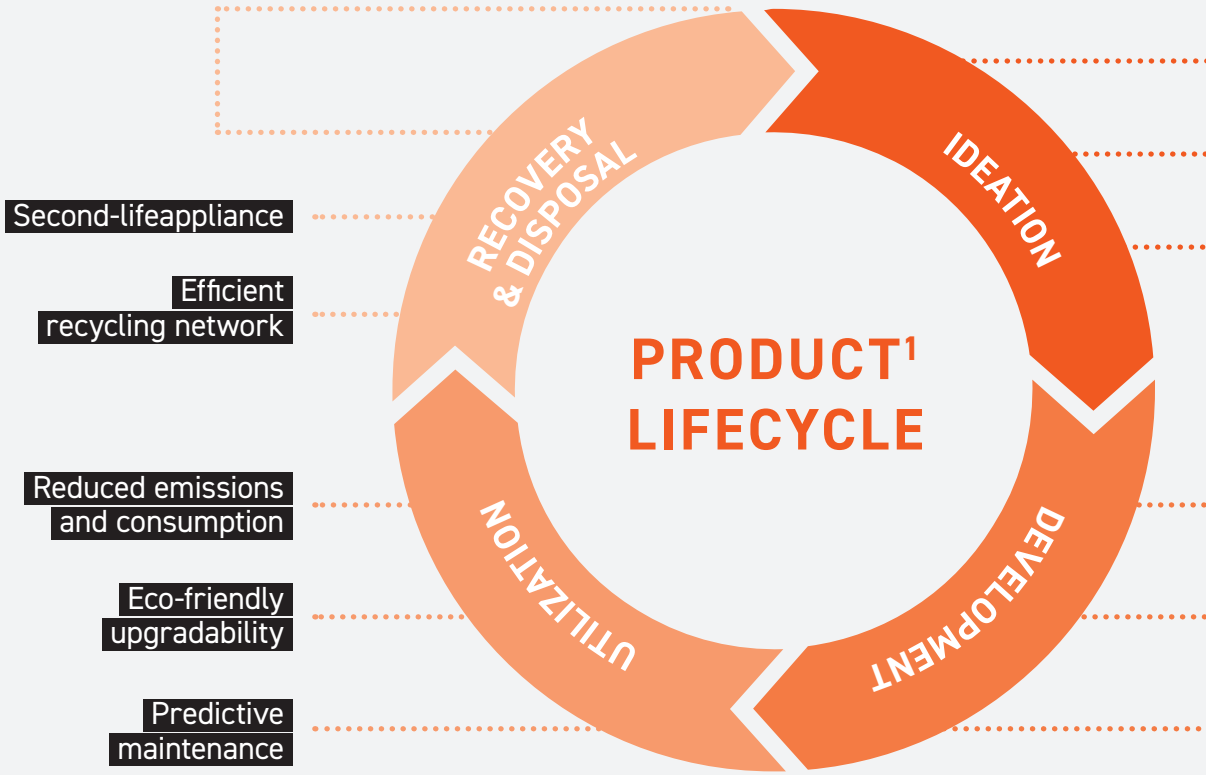
DESIGN FOR SUSTAINABLE PRODUCT USE, MATERIAL COMPLIANCE

Is an e-vehicle model automatically "green"? Or does its production and scrapping create new environmental burdens? If you formulate the most concrete sustainability goals for your product at an early stage, you will be able to identify hurdles and risk zones more quickly. The principle of "sustainable design" is generally suitable as a guiding principle, which aims to transform the social, ecological and economic aspects of sustainability into a positive benefit for the environment, manufacturers and consumers. Closely related to this is an examination of the topic of material compliance (MC), i.e., compliance with laws and regulations that restrict or prohibit the use of certain substances and/or materials in products. This is usually expressed in the trade-off between the financial and environmental costs resulting from the composition of product components. Metrics can include the projected carbon footprint and other emissions or pollutants. At this point, one should also consider whether higher costs for more environmentally friendly components, for example, can be communicated and priced as added value for the customer.

ECODESIGN EVALUATION, ENVIRONMENTAL IMPACT ASSESSMENT.

To what extent is the product sustainable beyond manufacturing? The use phase of a product is particularly important and should be described or "simulated" as far as possible during product development. In the case of plastic injection molding machines, for example, the product and mold design determines the use of raw materials during operation. Electricity and water consumption as well as pollutant emissions during the use phase are indicators for a well thought-out and targeted sustainable product development.

PRODUCT DESIGN FOR SUSTAINABILITY



[1] **Product** is everything that can be sold, e.g., a physical product, software and service
LCE: Life Cycle Engineering LCA: Life Cycle Assessment TCO: Total Cost of Ownership NPI: New Product Introduction
PDP: Product Development Process CO_2 e: CO_2 -Equivalent

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Sustainability as driver for innovation

Estimation of sustainability payback

Evaluation of eco-induced customer experience

Design for sustainable product manufacturing & use, material compliance

Evaluation of eco-design, environmental impact assessment

LCE-methods: TCO, LCA, CO_2e-index, simulation, DOE etc.

TARGETED DESIGN ACTIVITIES ENABLESUSTAINABLE PRODUCTS WITH THE FOLLOWING MASTERED COMPETENCES:

- *Balanced product-portfolio incl.sustainable products*
- *grated Life-Cycle-Engineering approachsupporting cycle-economy*
- *ted NPI / PDP anchoring sustainable approach in product design*
- *Implementation of sustainability management system for product ranges*
- *Reduced resource usage in product development (e.g., number of test samples)*
- *Use of digital potential for a global-consistent monitoring of the sustainability performance*
- *Anchoring of sustainability culture and mindset in product design*

LCE METHODS

Life Cycle Engineering (LCE) is an umbrella term that encompasses a range of methods used by companies to evaluate the aforementioned points. Life cycle assessment (LCA), for example, looks at the environmental impact of products throughout their entire life cycle. When applying these and other analytical methods, companies should create standards via processes and applications that address the broadest possible product spectrum within the company. This quickly reveals which competencies are missing, should be purchased or built up in-house.

These methods are ideal for creating an index for usage recording - i.e. for all environmental costs that do not result from production. In the case of a CO_2 -neutral injection molding machine, this can refer to its oil and electricity consumption during the complete use phase, among other things. And in the automotive industry, for example, we talk about the decarbonization index per vehicle, which is determined from the CO_2 emissions for a predefined usage behavior. This product view in turn gives rise to exciting new options. For example, how digital tools/functionalities can capture this information and make it measurable - and whether this data can also be used for purposes other than product improvement.

Modular upgrades are effective sustainability drivers.

USAGE

The product and, if applicable, the services associated with it must then prove themselves in use. Those who have drawn the right conclusions from the analyses, tests and simulations of the preceding phases should now be in a position to offer their customers as well as the environment measurable advantages in the reduction of energy costs, emissions or pollutants. Three aspects are particularly important here.

PREDICTIVE MAINTENANCE

The classic use case for predictive maintenance is the upkeep of machines. Today, digital tools warn the operator at an early stage when a motor threatens to overheat or plant components show signs of wear. The principle of increasing the mileage or service life of the product, for example by sensors detecting wear and damage at more and more critical points, can be transferred to other areas of application and will continue to gain in importance in the future. This minimizes resources in the form of spare parts and protects the environment.

ENVIRONMENTALLY FRIENDLY UPGRADEABILITY

Does it have to be a new smartphone - or isn't it enough to replace the software or even individual hardware components if necessary? The failure of smartphone manufacturers who wanted to use a modular design to increase the product's longevity and reduce the resources required to manufacture it illustrates the dilemma behind this aspect. The approach of making the smartphone's processor and battery more durable, for example, makes ecological sense. However, it loses out to the economic factor as long as the customer does not buy the product.

In industry, modular upgrades are already effective sustainability drivers, for example in the case of machine tools or in special machine construction. Manufacturers of equipment for packaging production, for example, often already develop these for a higher output than is actually required in use. If the customer needs to increase output, the hardware and software can be retrofitted, i.e. configured, instead of having to install a completely new system. The customer saves money, the manufacturer can offer new services around this modular structure, and the ecological footprint of the product improves through longer use.

REDUCED EMISSIONS AND CONSUMPTION

The reduction of emissions and consumption is the core discipline - here, every new product generation should aim for zero values. The prerequisites for this are provided by the fields of action already mentioned. A good example is the battery of an electric car, whose maximum storage capacity decreases over the years. The storage locations of the latest battery generations are modularly structured in packages of cells that can be replaced individually. This means that the disposal or recycling of complete batteries will soon be a thing of the past. However, the example also illustrates that an overall lower resource consumption of the product often requires more development effort - these efforts, by the way, are strictly speaking also "consumption values". A high level of transparency is achieved by companies that include as many services as possible in their sustainability balance sheet as they pass through the product life cycle. In addition to the work required to develop special product properties, these are above all the manufacturing resources expended.

RECOVERY & DISPOSAL

The fourth phase involves the disposal or reuse of the product, either as a whole or in its component parts. Two challenges have to be solved here: What happens to materials/substances that cannot be reused? And more importantly, how can this phase already be taken into account in the other stages of the life cycle in such a way that the proportion of these materials is minimized?

EFFICIENT RECYCLING NETWORK

The use and disposal of product components such as batteries, plastics and lubricants can generate pollutants that cannot be easily disposed of. There are two options for reducing this proportion to zero or keeping it low: one is substitution, e.g. replacing plastic with another, ecologically degradable material; the other is the option of minimizing the use of the harmful materials. This requires a precise knowledge of what happens to the product during use and disposal, which in turn is an integral part of the development phase as "design for sustainable product use".

For example, some "green" products that include lithium-ion batteries pose a risk of flammability. Or toxic chemicals are used in the manufacturing process, e.g. to achieve higher energy storage efficiency. It is therefore the responsibility of product developers to minimize these proportions or to find new solutions - ideally in exchange with scientific institutions or research initiatives as well as the partners in the value network.

SECOND-LIFE APPLIANCE

A "second life" for the product is another ideal solution. This means that once the product has fulfilled its original purpose, it is simply reused in another area of application in order to minimize overall resource consumption. Examples include the use of rechargeable batteries from e-vehicles as a storage medium for real estate or the recycling of trains, through which individual components can still be used in other areas after many years without any problems.

Depending on the industry, there are still many options for improvement in this respect. In the case of household appliances, for example, a high proportion of large appliances are recycled, but reuse after repairs is still rare and not at all common in the case of smaller household appliances. However, improvements in the collection and sorting of small appliances in particular represent an important driver for higher recycling rates.

Every company that pursues a sustainability strategy should address the life cycle(s) of its products. Where to start in the sequence "from the cradle to the resurrection" is not necessarily decisive. It is more important to question successes anew: How can resource consumption be further reduced? How can the customer be inspired with a sustainable product design? This applies not only to the performance values of the end product, but also to resource consumption in terms of the materials used (and even in terms of the human capital employed) along all phases in the product life cycle. The more consistent the approach here, the better the balance sheet looks at the end of a long, green and profitable life cycle - and the more likely it is that the product or a high number of its components will be given a "second life".

Development resources are to be quantified as part of the product life cycle.

Milestones for a green Transformation

Marcia de Troyer, Vice President, ROI-EFESO

BEST PRACTICE

INTEGRATING A SUSTAINABILITY INITIATIVE WITH AMBITIOUS TARGETS INTO BUSINESS

IMAGINE, YOUR MANUFACTURING NEEDS A WHOLE OLYMPIC SWIMMING POOL OF WATER – EVERY DAY. AND BESIDES THAT, THE AMOUNT OF CO_2 OF A 40.000 PEOPLE TOWN IS EMITTED ALSO DAY BY DAY. SOUNDS LIKE A SMALL DEMAND TO YOU?

Well, in this case it was not seen like that. Our client, a global player in the pharma industry, decided to reduce his entire CO_{22}-, water, and waste consumptions by driving a cultural transformation. How serious the company was about this is made clear by the objectives of this sustainability initiative: a reduction of 35% CO2 , 25% waste and 20% water by 2030 at the latest.

They already were doing small projects left or right, but these targets could be described as aggressive rather than ambitious. So how could the entire operations be mobilized in working on that? This is where we came in.

A short-term agenda for a long-term success

The companies' requests was to set up a progression strategy and approach to engage management and employees to really start to create a transformation script. So we developed an approach for one pilot that we could test in a single plant. In case of success, this should be used for a global rollout to all the other plants and to the other departments. The project management process was clearly structured and well prepared: before the pilot started, the company already identified areas for reduction measures in a own assessment. On this basis, we tackled the following issues with the team responsible for the sustainability initiative in the company and developed appropriate solutions.

CO-CREATING A CLEAR ROADMAP FOR MEASURABLE RESULTS

At the beginning, we tested and fine-tuned our progression strategy with the pilot plant. Basically, we developed a roadmap and the scripts for the implementation. Later on, those scripts were implemented step by step by the companies' departments as well as in the other plants. This approach takes two key challenges into account that are typical for dealing with such big targets: how do you define them in concrete targets? And how can you engage management and employees in the plants in a most effective way? Usually, they have to reach targets every day. But a target like a reduction of CO_2 with 35% in 2030 sounds so abstract that it is hard to feel committed to it. Together with the people of the pilot plant, we first defined the targets for the roadmap, but we also discussed how to identify concrete improvement opportunities.

The sustainability targets: aggressive rather than ambitious.

ACTIVATING OPPORTUNITIES

The next step was to broaden the horizon of these opportunities. If people have worked all their lifes in one plant, they usually are not aware of other ways of working, other technologies that exist. So, we brought in experts that could bring in more innovative ideas. And based on that, we went to initiatives to see what the manufacturing team can do in the short and medium run, but also in breakthrough initiatives. Typically, in a plant, people work on the short term and the medium term and improvements. But in case of the breakthrough initiatives, it is very difficult to completely take distance and think about something completely new, if you've worked in a process for 20 years.

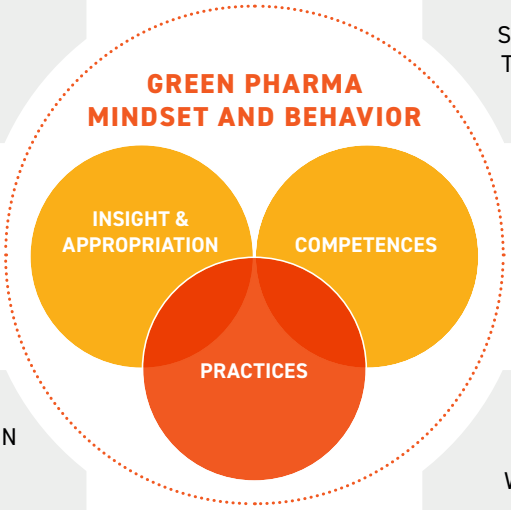
Based on that, we decided to split the roadmap in a ten-year frame and in a year-by-year perspective with more detail of the year to come. By doing this, we wanted to link the sustainability progression roadmap to the existing business cycle. So, it was linked to the ten years CapEx plan and to the budget for next year. By this way, the sustainability initiative starts to get really integrated in the business – instead of standing aside like many other programs or ideas. Furthermore, this procedure defines a governance and involves in the right people at each level. This is also crucial, because all stakeholders from the assembly line up to the management board must be convinced to go through that journey.

GREEN PHARMA: SIX LEVERS TO REALIZE THE TRANSFORMATION

DEFINE THE **PROGRESSION STRATEGY** FOR THE GREEN PHARMA INITIATIVE

A STRONG COMPELLING **STORYLINE**

LEADERS AS EXAMPLES AND AMBASSADORS CONCRETIZATION OF **SPECIFIC BEHAVIORS** FOR EVERY POPULATION



SET UP A PERFORMANT **SYSTEM** TO **MANAGE THE PROGRESSION** OF A GREEN MINDSET

A WELL MANAGED **PORTFOLIO OF IMPROVEMENT INITIATIVES**

CAREFULLY SELECTED **VISIBLE BASICS** WITH STRONG SYMBOLIC VALUE

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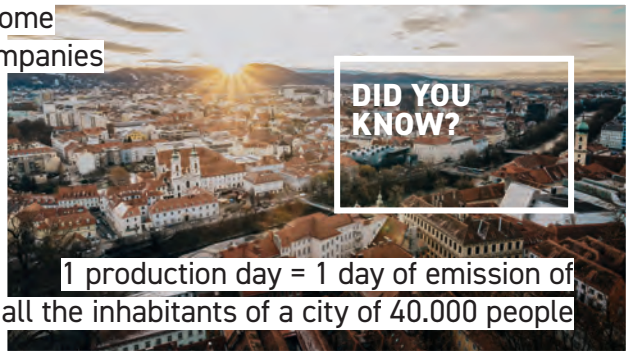
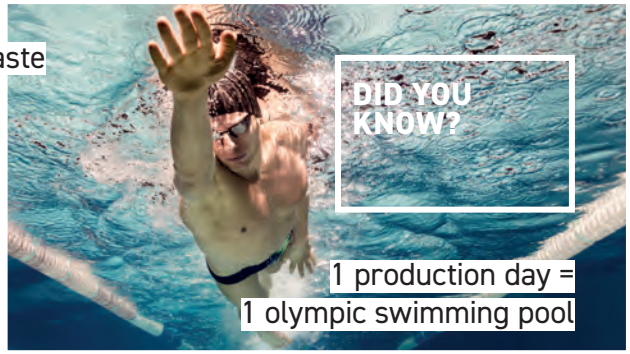
We set the right ambitions to become one of the leading sustainable companies

Did you know that our company produces the same amount of waste as a mid-size town?



1 production day = 1 day of emission of all the inhabitants of a city of 40.000 people



1 production day = 1 olympic swimming pool

How can you engage people in in a most effective way?

CREATING A FACTUAL STORYTELLING AROUND KPI AND DATA

A very important step was to make the abstract project KPIs more tangible. In doing so, it proved to be very important to value the professional experience of the scientists and engineers. This is a question of communication, e.g. to point out that indeed they are the actors of a big change. And, of course, a pharma company is especially seen as a role model for responsible behaviour in the public eye. The second communicational challenge was to make the big KPIs of the project more concrete. For example, saying 'we have to reduce our waste by 25%', it is very abstract. Instead of this, we transformed this numbers into a factual storytelling as mentioned at the beginning or in other visuals like the ones shown here.

We linked the sustainability progression roadmap to the existing business cycle.

BREAKING DOWN TO OPERATIONS

Of course, it was also clarifying and making it concrete what it would mean in operations, what the company had to do differently. For example, regarding to spend in innovation, construction materials for new buildings, change the supply chain, circular product design and so on. We started with a campaign within the employees that were already contributing could make own movies about their green activities in the company and post it. This made it very lively what was going on in the project. But furthermore, we connected it with the project documentary to give the management a tangible outcome about the results and the most promising measures for the next year. And at this point we talked about a roadmap in the way how we would approach things realistically and successfully.

On the Way to a green future

After the first year of the project, the pilot was successfully implemented. Based on the analysis, they also decided to build a complete CO_2 neutral pharma plant. So, the company continued to use our methods in the years to come and we can already see that they are achieving their targets.

According to that, another aspect of purpose-related communication came into play: by sharing the sustainability movies and visuals within the association of pharma companies, it strengthened the case of what pharma was doing do fundamentally change its business. This also led to airtime in the media – finally a perfect involvement of all internal and external stakeholders.

Storytelling and visualization are key to engage people and change behaviours.

"THE NEXT DECADE IS ABOUT COMBINING MATERIAL SAVINGS AND MATERIAL CHANGE"

Dr. Fritz Flanderka, Managing Director of Reclay Holding GmbH, on trends and drivers for sustainable waste management

DIALOG: Mr. Flanderka, the circular economy represents an important sector of the German economy, with significantly rising sales and employment figures. Does the model have potential for global success?

FF: In general, I think there is no alternative to the change from a linear to a circular economy in order to solve two of the greatest challenges of our time: One is global CO_2 reduction in the context of climate change. The other is that waste management must evolve, especially on the issue of plastics, in order to finally make significant progress in the fight against marine pollution.

Our circular economy model is certainly not transferable 1:1 to other countries. The starting conditions are very different; moreover, we are talking about a complex process that is constantly evolving with many players and high dynamics. But our experience is certainly valuable in a transformation toward sustainability - especially in waste management and recycling, because we have been building up expertise in these areas for a good three decades.

DIALOG: How interested are other countries in this know-how? Especially populous and economically strong nations like the USA or China have so far simply rejected sustainable waste management?

FF: Right - until now! That is changing seriously at the moment. For example, we are observing a trend reversal worldwide toward differentiated waste collection systems. This is where value can subsequently be added - or operators can at least reduce the amount of waste going to landfills. In addition, there is a change in awareness with regard to the separate collection of waste: The principle or idea that we developed in Germany with the "Green Dot" is being perceived, discussed and taken up by society in the EU, but also in many U.S. states or in Asia - with a corresponding impact on the actions of companies.

DIALOG: So more is being done than just giving the corporate image a "green" coat of paint?

FF: I think most companies know the risk of such a strategy. In addition, legal requirements in the EU now set a few clear guidelines for sustainable business. And that is also being taken up with motivation.

If we look at the way we deal with packaging, for example, there are three main trends in this country: First, a strong interest in reducing their production in general. Second, to achieve significant material savings through product design, especially for consumer goods such as beverage cans or yogurt pots. There has been enormous progress in this area over the past ten years, but the potential is far from exhausted. In the next decade, the aim will be to combine material savings and material changes in areas where this has not been possible so far, for example for hygienic reasons. And in other areas, even more plastic packaging will be replaced by materials that are easier to recycle.

The third trend is to further improve the recycling of plastics. Here, however, the game has only just begun due to the new recycling requirements in Germany. Polyethylene (PE) and polypropylene (PP), for example, are relatively easy to recycle if you get them unpolluted. This is much more difficult with so-called plastic compounds. These are mostly technical plastics that are used, for example, in minced meat or other fresh products. At present, this material is either very difficult to recycle or cannot be recycled at all. One solution is to replace these plastic compounds with pure plastics, which are then applied at different densities.

Linear economy: A large proportion of the raw materials used are landfilled or incinerated after the products have been used, and only a small proportion are reused.

Circular economy: In this regenerative system, resource use and waste production, emissions and energy waste are minimized. To this end, energy and material cycles are reduced, slowed down and closed.

DIALOG: What potential do you see in the industry for returning a higher proportion of packaging material to the cycle through reuse or recycling in the future?

FF: That depends on the goods being manufactured and the transport conditions. If we're talking about high-value technical goods, for example, as in mechanical and plant engineering, their protection during transport is a priority. In terms of the type and quantity of packaging materials required, the scope for change is therefore quickly exhausted. In the long term, however, the transparency of the material flow, for example in the case of a deposit system, will also lead to improvements.

I see considerably more options in all areas where goods are consolidated for shipment in B2B trade. Anyone who wants to act more sustainably here should answer two questions in particular: First, which material is used for which purpose? Second, where can material be eliminated without replacement? The Euro pallet is a prime example of how established things are being rethought: The classic wooden pallet splinters quickly, deforms, absorbs moisture and therefore needs to be repaired or replaced after two to three years on average. A plastic pallet does not have any of these disadvantages and usually remains in circulation for over ten years - after which the plastic can be used again for new pallets.

DIALOG: So this calls for creativity on the part of packaging manufacturers and companies to find new solutions together ...

FF: That's how it is. However, this is not only based on voluntariness. Recently, not only the manufacturers but also the users of the packaging have had to fulfill new legal obligations. For example, anyone who sends their products to other buyers must point out that they are also obliged to take back this packaging. In addition to this information obligation, documentation must be kept on how this obligation has been met and in what form the materials have been recycled. This is not a world revolution, but it sets the guidelines for the direction of the necessary change.

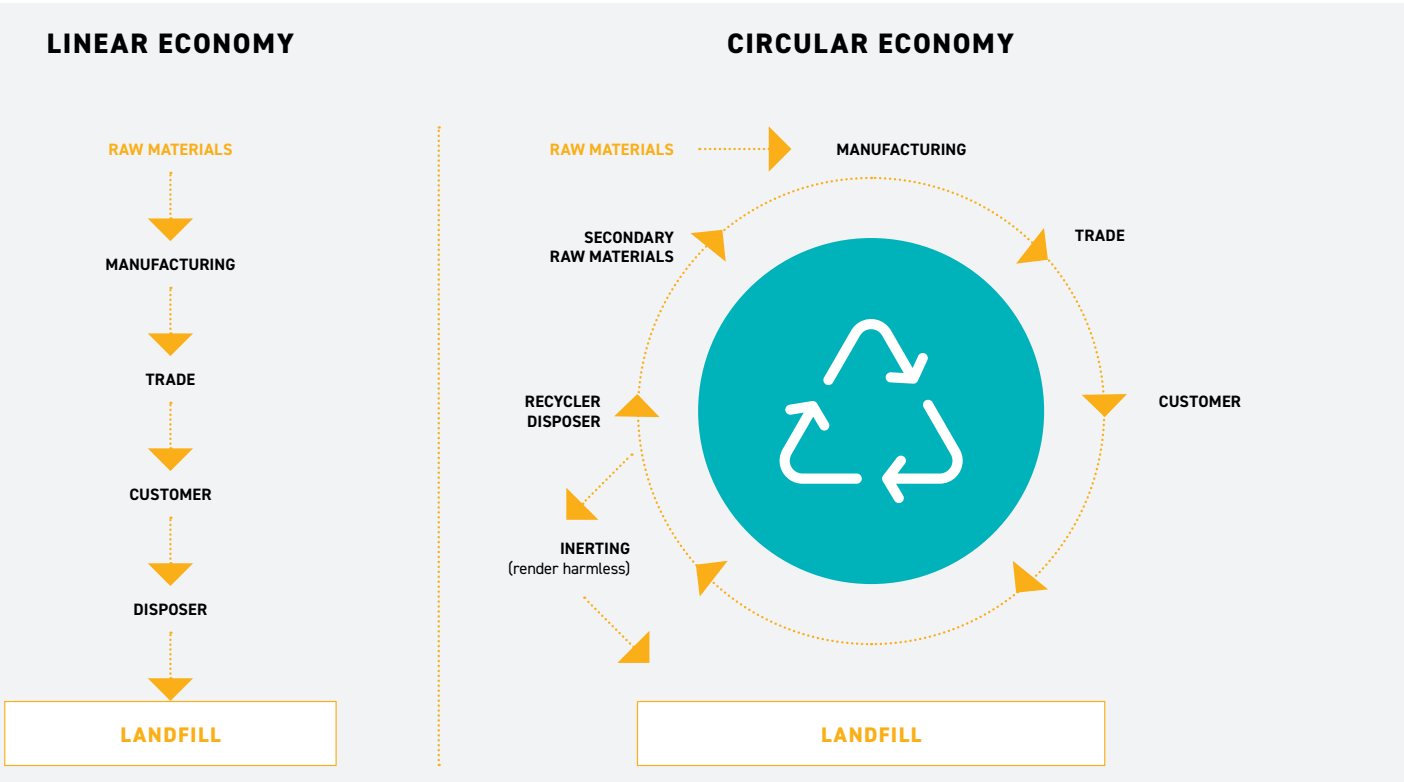
DIALOG: Apart from regulatory requirements, what else is driving this transformation?

FF: Two effective forces are particularly important: firstly, cost savings, and secondly, customer demand. Cost savings constantly motivate people to rethink and reevaluate processes anyway. In case of doubt, superfluous packaging materials are dispensed with or the design is redesigned so that the same result can be achieved with simpler materials.

In addition, in our experience, customer requirements have a high priority, particularly in the German retail sector and there again very pronouncedly in the discounters - where large programs are already underway to optimize the use of packaging. And these specifications are passed on to the suppliers. For example, almost all discount grocery stores have their own guidelines on how and with what materials products are to be packaged.

The Reclay Group is an internationally active service provider in the field of recycling and materials management. With more than 170 employees at twelve locations worldwide, the group of companies supports over 1,750 contract customers from industry, trade and commerce in achieving their environmental targets and fulfilling their product responsibility.

Dr. Fritz Flanderka,
Managing Director,
Reclay Holding GmbH



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Tobias Eriksson,
Vice President, ROI-EFESO

USING DATA AS A GROWTH RESOURCE

HOW DIGITALIZATION CAN ENABLE SUSTAINABLE FOREST AND PACKAGING OPERATIONS

FOREST AND PACKAGING COMPANIES NEED TO INNOVATE TO OVERCOME A CONTRADICTION BETWEEN THE ABILITY TO DRIVE AND CAPITALIZE ON INCREASED DOWNSTREAM INNOVATION TO CAPTURE GROWTH POCKETS. AT THE SAME TIME, THEY HAVE TO HANDLE INDUSTRIAL SUPPLY CHAIN ASSETS EFFICIENTLY.

By doing this, managing forest and fiber assets in a competitive yet sustainable way is becoming a core strategic capability for them. If they want to achieve sustainable and profitable growth, they must effectively manage this contradiction between value chain integration and multi-specialization. Furthermore, digitalization should be recognized and used as powerful enabler to support and align with these two elements. By doing this, companies should observe the following rules and trends.

FOLLOW PRODUCTS THROUGHOUT THE CYCLE

Because fiber and its derivates, such as packaging solutions, can enter adjacent circular flows, there is an increased importance of the strategic capability to understand and enhance adjacent circular economic flows. This makes it crucial to leverage usage data and process loss intelligence data within an ecosystem of partners across adjacent flows, and digital sustainability product passports that follow products throughout the cycle.

But digitalization offers even more opportunities, of course. Data activation, analysis, monitoring, end-to-end tracking and tracing, and forest fiber origin guarantees come together with solid TPM and Lean based operational platforms to allow these companies to deliver on sustainability and consumer demand while still remaining competitive. Future investments in the industry should already upfront be leveraging digitalization opportunities as part of the move to transform white- and blue-collar work into higher value-adding activities. Modern early management techniques are well-fit for this.

KEEP UP WITH A CHANGING LANDSCAPE

There are good examples of intelligent locally developed digitalization use cases and proof of value initiatives that help to paint the picture of how to keep up with all this change through central funding and testing. Just a few examples of what's out there: Drone-based inspection of forest assets, virtual 3D-simulation and training environments for emergency shutdowns in pulp production, image-based quality inspection of paperboard production via intelligent analysis tools.

Local initiatives often do not scale due to the long investment cycles of the industry. This can lead to phenomena such as multi-generational production line equipment within a single mill, or non-integrated software environments. The fact that a solution works in one site does not mean that it scales well into others.

There are also challenges or prerequisites to consider with Big Data analytics. Allowing different shift teams to work in different ways makes it hard for artificial intelligence to provide real prevention

There is an increased importance of the strategic capability to understand and enhance adjacent circular economic flows.

and prediction insights. Or, for example, it is feasible to analyse signals around a paper machine to prevent web breaks. But significant results in terms of increased efficiency and effectiveness of manufacturing processes are not delivered by technology alone – here, the knowledge of the employees is also a decisive success factor. Total Productive Maintenance (TPM) processes involve the workforce, for example, when it comes to reducing noise in production. To this end, the implementation of standardized cleaning, inspection and lubrication (CIL) procedures is essential, and line employees can and should contribute to their best possible implementation.

INTEGRATE IT WORK WITH KAIZEN AND RETHINKING THE LOSS CONCEPT

One of the key challenges along the path to unlocking the full potential of Industry 4.0 is the question of how to integrate horizontal smart digitalization platforms and modern high-performance operations systems based on Shingo philosophy, and Lean and TPM models. There is a concrete path towards this goal, that industries are starting to address now. They fully integrate IT organization work with an organization's continuous improvement teams – part of the Kaizen approach of making constant small positive changes that can result in significant growth and efficiency enhancements – and other more focused improvement teams, to generate more top-down project driven change.

In addition, many operational losses can be eradicated by routines developed by the people working in processes: e.g., reducing web breaks to zero, reducing water consumption by 30%, reducing material losses by 70%. If these examples were expanded horizontally across the industry, the world would be in a much better state and the companies of our industries would be better equipped, standing on a fundamental capability to also attack sustainability losses in all areas in the same systemic way. Further to this, a good example of a transformational step-change opportunity to minimize strategic losses in circular flows lies in volume and routing planning software for transportation system solutions for packaged goods. Up to 50% of sustainability losses here originate in goods transportation.

CREATE A ROADMAP TOWARDS SUSTAINABLE OPERATIONS

Forest and packaging companies must build a robust Industry 4.0 strategy roadmap for their digitalization journey. This must, in turn, be supported by a target information and communication technology architecture. For this industry, taking a five-year perspective is optimal, with a zoom-in on the first 12 to 36 months.

Circular economy flows—economic systems aimed at minimizing waste—are replacing traditional value chains, and the forest and packaging industry has the means to this transformation not only for its own directly-controlled circular flows, but also as it enters into others. We likewise identified that investor screening of poor environmental, social and governance (ESG) scores for forest and packaging companies can follow negative publicity. The fact that ESG share price valuation indexes strongly influence the direction of the companies means that there is a need here for increased transparency, which is another opportunity for digitalization.

CHANGE THE SYSTEM ITSELF

To fully unlock the potential of sustainable digitalization, forest and packing companies must adopt the sustainability agenda systemically. Sustainable Development Goal #9, in particular, calls for action for sustainable industrialization and encourages organizations to take control of their internal sustainability losses, integrate sustainability work into operations, and engage co-workers on every level, leveraging a strong TPM based backbone capability.

Today, machine learning and pattern recognition can be used to predict and prevent defects and disturbances, a technique has been around for many years now. If the industry addresses the challenges and implement the basic TPM work, there are huge opportunities to get support on the journey to zero losses with existing solutions and further spurred and accelerated by new technology. We just need to constantly stay abreast, injecting new competence while involving and engaging the know-how that we have in our organizations.

Many operational losses can be eradicated by routines developed by the people working in processes.

Andrea Montermini,
Vice President, ROI-EFESO

Evaluate Sustainability Risks

BEST PRACTICE

SUSTAINABILITY RISK INTEGRATION IN THE PROCUREMENT OF A CAR MANUFACTURER

INDICATORS AND METRICS OF PURCHASING ACCORDING TO THE SUSTAINABILITY ACCOUNTING STANDARDS BOARD (SASB)

TOPIC	ACCOUNTING METRIC	UNIT OF MEASURE
GHG EMISSIONS	• *Emissions from procured products, transport of supplies, business travel* • *New suppliers that were screened using Emissions criteria*	CO_2 (T)
ENERGY MGMT	• *Total energy consumed* • *Percentage grid electricity* • *Percentage renewable*	GIGAJOULES (GJ) PERCENTAGE (%)
WASTE MGMT	• *Total amount of waste from manufacturing* • *Percentage hazardous* • *Percentage recycled*	METRIC TONS (T), PERCENTAGE (%)
PRODUCT SAFETY	• *Number of recalls issued* • *Total units recalled*	NUMBER
LABOR PRACTICES	• *New suppliers that were screened using social criteria*	PERCENTAGE (%)
DESIGN FOR FUEL EFFICIENCY	• *Revenue from products designed to increase fuel efficiency and/or reduce emissions*	REPORTING CURRENCY
MATERIALS SOURCING	• *Description of the management of risks* • *associated with the use of critical materials*	N/A
SUPPLY CHAIN MANAGEMENT	• *Supplier CSR rating* • *New suppliers that were screened using CSR criteria*	PERCENTAGE (%) ABSOLUTE NUMBER
COMPETITIVE BEHAVIOUR	• *Total amount of monetary losses as a result of legal proceedings associated with anticompetitive behavior regulations*	REPORTING CURRENCY

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"Let's build the first real sustainable car – with recycled raw materials, zero emissions, cleanest energy and with AAA labor practices through the whole supply chain!" Well, dreams can come true. If any car manufacturer is already pursuing this mission, he is probably producing very small quantities. And of course, it is not impossible that such a vehicle will roll off a mass production line at some point, setting a new milestone in automotive history.

But today we are fare away from that. Facing sustainability means to struggle on many places with different rules: relying on the right drive technology, predicting customers' needs at time and getting transparency in the supply chains ... all important fields of action, without a doubt. But in general, the confrontation with sustainability brings up questions and dilemmas that a company never thought about before. Which trade-offs between sustainability and profitability are acceptable? How to uncover areas where sustainability increases profitability? And what are the most important key performance indicators (KPIs) for managing the value chain?

A NEW, KPI-DRIVEN CONCEPT

But today we are fare away from that. Facing sustainability means to struggle on many places with different rules: relying on the right drive technology, predicting customers' needs at time and getting transparency in the supply chains ... all important fields of action, without a doubt. But in general, the confrontation with sustainability brings up questions and dilemmas that a company never thought about before. Which trade-offs between sustainability and profitability are acceptable? How to uncover areas where sustainability increases profitability? And what are the most important key performance indicators (KPIs) for managing the value chain?

Commodity Strategy

In this part, we started to rebuild the existing procurement strategy by four steps: first, setting category and context for the strategy, e.g. in terms of product and perimeter, market evolution and internal / external benchmarks. Second, we collected and analysed further inputs, especially regarding to the commodity business model and supplier risk management. This resulted, thirdly, in a new category strategy with an updated supplier panel, a business vision and a positioning matrix. As the fourth element, concrete action plans for the procurement made this strategy package complete.

Triple-p approach

This was not aligned to sustainability criteria at all. But already in this project phase it became apparent, that we could not start deploying an ESG (Environmental Social Governance) strategy and report certain commitments at very high level. It was necessary to point out a bigger scope and so we decided to propose not to have a standalone project but to combine new fields: on one side the commodity strategy which is really providing the guidance on each category and supplier segment. On the other side, we improved the way they plan and report the procurement activities, e.g. with business plans and sourcing ways.

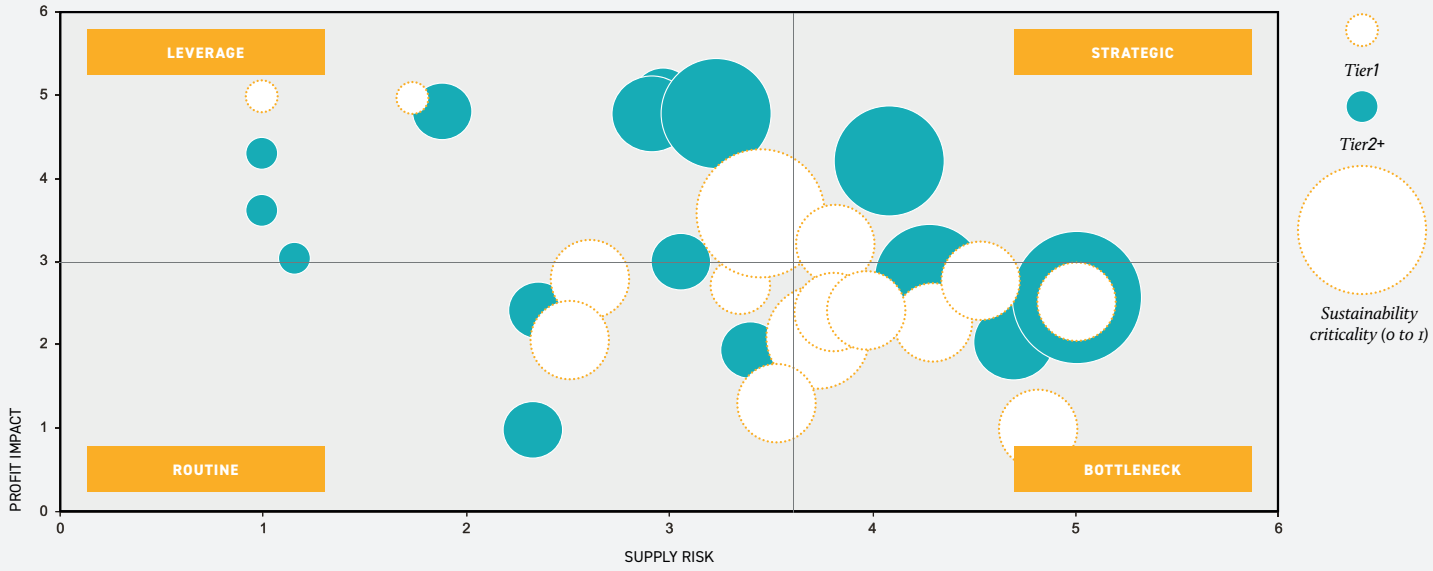
And thirdly, we combined the risk management and sustainability perspective. That means to incorporate the ESG KPI and following initiatives that will be executed as a part of the risk management activity. The pragmatic reason to do so was, this was the quickest way to immediately raise the relevance of sustainability for the supplier management and the quality strategy and link it to the way they run the business on a daily basis. The framework for this is a triple-p approach which is referring to the dimensions environment (planet), social (people) and economic (profit). Proceeding from this, several aspects are evaluated – regarding to profit typical supply risks like material availability but also new one like cyber risks, for example. But the essential value for a 'sustainable movement' of the organization is taking place in the social and environmental dimension. Here is a more detailed framework for concrete risk management actions necessary.

Automotive sourcing KPI's and metrics

For sustainability, we addressed some main pain points. For instance, the company did not have any action for tangible results on one dimension of the sustainability report like the conflict minerals. So, we expanded the traditional risk management framework by using the triple-p approach. To get a quick and pragmatic about what is possible, were testing this approach in one of the company's plants as a pilot project. To link sustainability topics to a risk matrix, we were deploying several KPIs to be incorporated into risk management. Those KPI cover a very brought spectrum of topics and numbers, e.g. the total energy consumption in Gigajoules, the percentage of recycled waste or the supplier CSR rating (graphic page 36).

RISK ASSESSMENT – SUMMARY VIEW

THE OVERALL PROCUREMENT RISK MATRIX IS AN EXTENDED VERSION OF THE CLASSICAL KRALJIC MATRIX WHERE SUSTAINABILITY ISSUES ARE TAKEN INTO ACCOUNT AS THE SIZE OF THE BUBBLES.



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FUTURE-ORIENTED SUPPLY CHAIN MANAGEMENT

Finally, we made clear that this Triple-p dimension was entering into the evaluation of the risks across the suppliers and the bill of material. Of course, suppliers are segmented also with the perspective of the bill of material that is the sum of all the parts that composed a vehicle. And so, there was a process installed to assessing and monitoring all the suppliers for all this in large panel of risk.

Furthermore, we started rating the different categories and commodities in terms of risk, also including risk connected to ESG topics. To visualize that information, we also have been upgrading the basic risk management dashboard in terms of criticality for sustainability. So, the dimension of the goal is to what extent we have a sustainability criticality into that segment (matrix "risk assessment" on page 38). For example, a commodity can be placed in a strategic quadrant, because it is high profiting, not locally available and so a high supply risk for the company – with a high impact to sustainability KPI, if it has to be sourced from other supplier in case of emergency. On the opposite, a local sourced component could have a low risk factor, of course.

This matrix is only the starting point. Currently, we are addressing the process: how to make a platform, how to set up a platform to have a routinary evaluation of all these elements without a lot of effort for the people. So, we will start providing new requirements to supplier to improve, by priority, their ESG profile. This will be a key factor in improving the company's overall sustainability ESG rating.

"SUSTAINABLE LOGISTICS PROMOTES INNOVATION"

A conversation with Prof. Dr. Werner Bick, Senior Partner at ROI-EFESO, about strategies to improve the environmental footprint in logistics

DIALOG: Professor Bick, what is the importance of logistics in improving the ecological footprint?

WB: Logistics plays a key role in the ecological balance of the value chain and the companies involved.

The particular complexity arises from the fact that a wide variety of partners typically have an influence on the structure and processes in logistics. As a rule, no one has full and all-encompassing access to the entire logistics network, to every sub-process and to every means of transport used. In addition, there are also very different local conditions depending on the extent of the network, which represents an additional challenge.

DIALOG: What options are generally available to make logistics more sustainable?

WB: Schematically speaking, four types of strategies can be distinguished: Avoidance, displacement, reduction and tempering.

Transport kilometers can be avoided through various approaches: The use of transport platforms to coordinate trips, through sharing concepts, and also smart transport planning, which is increasingly taking place with the use of AI.

When relocating, the focus is on planning optimal transport routes, whereby CO_2 emissions, which depend on the type of route and means of transport, must be included as a decision criterion.

In addition, greater efficiency and cleanliness of the means of transport and the use of telematics can also achieve positive contributions and reduce the emission of climate-damaging gases. After all, as an OEM, I can also reward my suppliers for achieving certain ecological goals. But the instrument is complex and ultimately limited in its effect. Rewarding and sanctioning are therefore regulatory instruments. And companies have no direct influence on these.

The decisive factor in using these levers is not methodological perfection, but a pragmatic combination of the individual approaches.

DIALOG: The partners in the logistics chain should be included in this analysis?

WB: Absolutely. As I said at the beginning, typically no one has full access to the network. You have to work together to achieve something. By the way, this also applies to the consolidation of data in the entire network. If this data is only available in fragments, existing potential, for example via AI, cannot be comprehensively tapped.

DIALOG: Does the optimization of the ecological footprint in logistics also set impulses beyond this?

WB: Absolutely. This becomes clear when you take the aspect of data use, for example. As mentioned, I have to integrate different systems, platforms and data models to get a valid and complete view of the entire logistics process and the corresponding ecological footprint. This also lays the foundation for the use of advanced analytics and AI solutions, and a self-learning process can be initiated that can lead to new insights. These will then not remain limited to logistics, but will have an impact on the entire value chain, on the entire life cycle of products. In this respect, I am convinced that the endeavor to make logistics more sustainable will also promote innovations at different levels.

Prof. Dr. Werner Bick, Senior Partner, ROI-EFESO

building industrial future

As one of the leading international management consultancies with an operations focus, ROI-EFESO has been helping companies in discrete manufacturing and the process industry to optimise their product and technology portfolio, increase operational excellence, design global networks, optimise the organisation according to lean principles and reduce costs throughout the entire value chain since 1999.

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