(10-003) - Mission ZeroEmission - Best practice towards NetZero

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The transformation process for a circular economy and the necessary remanufacturing requires a paradigm shift in both strategic and operational management. This means that project management also faces the challenge of dealing with this situation. Project Managers need an understanding that they been the designers of the future. The first possible approaches were presented and discussed last year. Further work in this direction has been carried out and published. The first practicable methods for merging strategic and operational management to overcome these organizational challenges can now be presented, as well as initial best practice examples, including from a global player for its 138 production sites worldwide, showing how these are to be brought up to NetZero by 2040 with the support of a PMO supported by software created specifically for the monitoring and control process.

Keywords: Circular Economy; Challenges for strategic and project management; Best Practices example towards NetZero

Mission ZeroEmission - Buenas prácticas hacia NetZero

El proceso de transformación hacia una economía circular y la necesaria remanufacturación requieren un cambio de paradigma tanto en la gestión estratégica como en la operativa. Esto significa que la gestión de proyectos también se enfrenta al reto de hacer frente a esta situación. Los gestores de proyectos deben comprender que son los diseñadores del futuro. El año pasado se presentaron y debatieron los primeros enfoques posibles. Se han realizado y publicado nuevos trabajos en este sentido. Ahora se pueden presentar los primeros métodos practicables para fusionar la gestión estratégica y la operativa con el fin de superar estos retos organizativos, así como los primeros ejemplos de mejores prácticas, entre ellos el de una empresa mundial para sus 138 centros de producción en todo el mundo, que muestra cómo estos se van a llevar a NetZero para 2040 con el apoyo de una PMO respaldada por un software creado específicamente para el proceso de seguimiento y control.

Palabras clave: Economía circular; retos para la gestión estratégica y de proyectos; ejemplo de buenas prácticas hacia NetZero

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1 Decarbonization? Circular economy? "We've never done it like this before!"

Decarbonizing production processes and designing them for a circular economy is a challenge for strategic and operational management. Projects continue to be implemented with the familiar demarcations between strategic decision-makers and those involved in operational implementation. Project managers deliver project results into closed structures on command. They do not see themselves as the designers of the future. Silo thinking and communication problems between strategic and operational management persist. Surveys of project managers and their own experiences confirm this (Glitscher, 2023; Friedrich, 2023).

Abandoning the *take-make-waste* (acatech, 2021) linear thinking that currently prevails in production processes to enable a circular economy confronts strategic and operational management with the issues of resource conservation, adapted process and product design, the necessary production technologies and the return of used products and their components as well as the economic and psychosocial issues of work and company organization. The situation is not only complicated, but highly complex. (Sharma, Dixit, Glitscher, 2023; Glitscher, 2023)

In 2023, only 7.2% of all economic entities worldwide had demonstrable circular processes. (Circular Economy Foundation, 2023) The global manufacturing industry is dependent on logistics chains, fossil fuels and rare raw materials. (Empower Green Production, 2023) For the manufacturing industry, this means not only the decarbonization of production processes, but also the recycling of materials and reusable materials and the avoidance of waste.

Greenwashing is the easy way. Companies are looking for ways to compensate, for example by promoting reforestation projects. The existing processes for production and services are being changed, if only hesitantly, in the direction of recycling. Ordinances and regulations are not necessarily supportive here. Legislators are trying to force companies to act towards biodiversity, among other things, through new or extended regulations and provisions. Regulations such as the *EU Nature Restoration Law* are an attempt to control the loss of biodiversity and the preservation of ecosystems. (McClellan, 2023) Beautiful graphics with a hoped-for effect circulate but no circular products. Auditors receive new revenue opportunities; the bureaucratic burden increases for those affected. The effectiveness of these measures for the hoped-for effects on ecosystems and the availability of raw materials and decarbonization is questionable. The tried-and-tested but no longer effective method of the controllability ideology is still being followed. A way of thinking that includes the eternal burdens of human actions and thinking in cycles is not visible. (Glitscher, 2021)

These ways of thinking and acting can be found in the methodological discussions about sustainable project management, such as in the methodological approach of *green project management*. The *greenwashing* of behaviors and methods of this professional group is intended to provide a guide to sustainability. Their actual effectiveness for decarbonization and circularity, derived from the buzzwords *people-planet-profit,* can be questioned. Excluding strategic decision-makers and their decisions from these methodological approaches to so-called sustainable project management is counterproductive. The communication of *WHY* this project should be carried out now and how and what it delivers, and how sustainability aspects are to be considered, is not considered or only rudimentarily. (Schoper, 2018; Habermann, 2024) Just as the ability of project managers with many years of in-depth experience, who can think beyond the end of a project and the associated delivery of the result, is not considered.

2 One world - Our responsibility

The buzzwords people-planet-profit point to the dilemma: How can an integration of these three factors be achieved for the preservation of the human species? Eight billion people are a challenge for everyone. Strategic and operational management must expand their areas of responsibility. This can be summarized in four words: One World -Our Responsibility. A short to medium-term objective and the mere delivery of results in closed structures remains in the linear process of *take-make-waste*. Transferring decarbonization and manufacturing processes into cycles requires a paradigm shift with long-term strategic thinking in close and continuous cooperation with operational implementation: Why is what achievable by when and how? What boundary conditions need to be created for this? What capabilities are required and how can these be achieved? - just to point out some of the questions that need to be answered in this direction.

The situation is complex. There is a photo by German photographer Hans Hansen showing one of the first VW Golf models disassembled into its then 7,000 components. The number of components for these and other manufacturers' models has since grown to around 30,000. (Manoury, Bassam, 2023) From the point of view of remanufacturing and the move towards a circular economy, this means looking at all the components of this model from new and different aspects of design, production, distribution, and reorganization within the company itself.

Figure. 1: One of the first VW Golf models disassembled into its components (Hans Hansen, photographer)

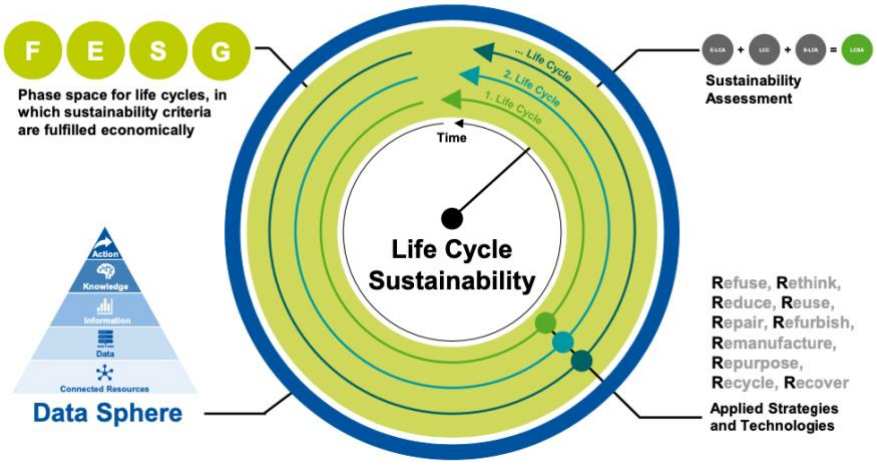
All human production, socialization, communication, and distribution systems are subject to sets of rules and a hierarchically controlled approach within the organizations. According to the ESG criteria, ecological, social, and economic sustainability must be included in these processes. Economic sustainability secures the necessary investment funds to ensure the necessary transformation towards a circular economy. Only these adaptation efforts will enable the growing world population to survive. The complexity of these tasks requires a step-by-step approach.

Fig. 2 below shows a possible approach for the necessary procedures for a circular economy as it is already being discussed in research and development. This affects production,

socialization, communication, and distribution processes. Existing management methods do not adequately reflect this - a paradigm shift - or rather its expansion - is necessary.

The R strategies - from Refuse to Recover - require these extended management systems from both a strategic and an operational position. A product or its components can be in different states over several product life cycles. *Life cycle sustainability* for a product, as shown in the diagram, is possible if sustainability criteria are achieved across these states.

Figure. 2: Schmitt, R.H.; Bodenbrenner, M., Brings, H., Montavon, B.: Data structures for resilient life cycle sustainability; in: Empower Green Production, Fraunhofer IPT, 2023



Strategic decision-makers must formulate corporate philosophical principles and communicate them convincingly. This responsibility includes principles that go beyond the continued existence of the organization in a competitive environment and the associated stakeholders: One World - Our Responsibility.

Operational management must be involved in the strategic decision-making processes. The following prerequisites must be assumed and integrated into the strategic decision-making and communication process:

- Project management has extensive operational knowledge of how and with what resources and with what effort implementation is possible and by when.
- Within projects that have already been realized, there is knowledge about how and where further developments of previous product developments in the direction of circular processes are possible.
- It can also be assumed that project management has the knowledge and experience to deal with complex challenges and how these can be solved. This implies that project management must understand and define itself as a designer of the future.

Organizations that already have structures for program management and, in addition, for project portfolio management and the associated organizational resources and experience can implement such a strategic-operational process of cooperation between organizational strategy and operational implementation.

To successfully achieve all sustainability goals within the specified timeframe, organizational change is required, not just a reorganization of business processes. All business units must include sustainability as one of the key pillars in their goals, and these goals must be aligned with the organizational goals. Looking at sustainability from a broader perspective, it is

essentially an extension of the social responsibility of the company itself. Where companies have previously retained a portion of their profits for social responsibility, they must now also include the necessary resources here to make a meaningful contribution to the preservation of the planet for human life: reorganization of the entire product further development in terms of decarbonization and the transformation into circular processes. (Mahaligam, 203))

The next section uses the example of an international group with over one hundred production sites worldwide to show how and on what basis the strategic decisions for *Mission Zero Emission* were made and how the operational implementation is realized with the support of a PMO with a portfolio process. As this is a very extensive program, only an outline can be presented here.

3 It all starts with a strategy: mission zero emissions.

It all started with a strategic decision by the management: to decarbonize all global production sites by 2040 and to go beyond this primary goal and look at how a sustainable product strategy can be achieved. It is undisputed that this requires the step described above to change the entire organization. Furthermore, the implementation of these ambitious goals, which are certainly associated with numerous risks, requires an organizational unit for management and control over a time frame of more than ten years.

The first step was to focus on the three groups of technologies, economic and social adjustments, and governance, institutions, and obligations to shape the next steps. (Mekala, 2014) These were seen as challenges, and it was clear that the implementation of the *Mission Zero* strategy would take a long time (see Table 1).

Table 1: Challenges on the way to NetZero (Mekala 2014)

Technologies	1 Technological innovations
	2 Ability to create large-scale supply chains and corresponding infrastructure
	3 Availability of natural resources
Economic and social adjustments	4 Availability of capital and efficient financing structures
	5 Management of changes in demand and short-term changes in unit costs
	6 Compensation mechanisms for coping with socio-economic impacts
Governance, institutions and obligations	7 Regulatory standards, control and market mechanisms and effective institutions
	8 Engagement and collaboration of public, private and social sector leaders worldwide
	9 Support from citizens and consumers

On this basis, the five levels necessary for implementation with the required measures and the organizational and personnel structure were designed (Table 2).

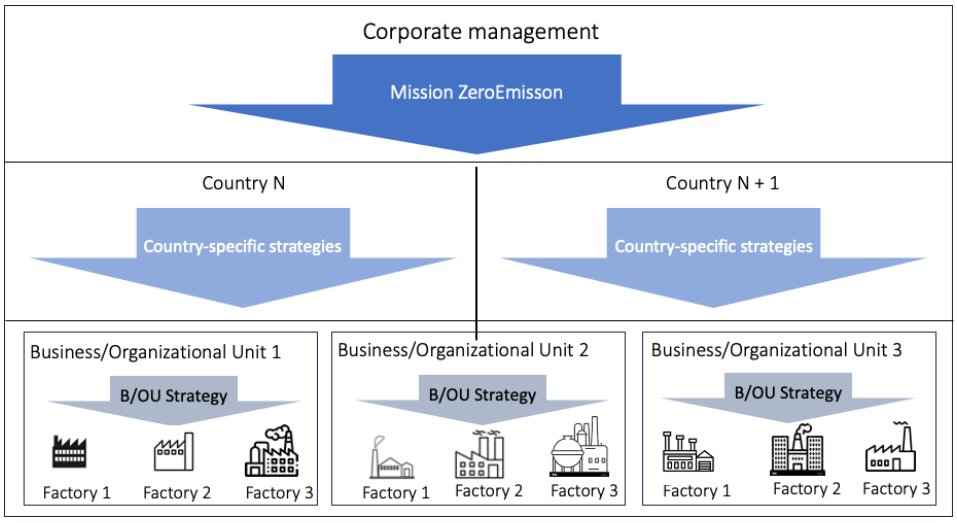
Table 2: The five levels required to implement *Mission Zero Emission*

1st level	Determination and evaluation of the "ecological footprint	Assessment of the organization's current and past environmental footprint: Which resources are used where and how? Resource management processes? What data is available and in what dimension? What data is needed?
2nd level	Definition of suitable baselines	Goal setting: What should be achieved by when and how? How should the process for achieving this goal be defined?
3rd level	Quantification of objectives	Achievability is the most critical aspect. The defined goals must be achievable, scientifically validated and communicated. Each goal must be backed up with realistic planning. What initiatives are necessary, etc.?
4th level	Target validation	Check whether the objective is scientifically validated. Coordination with the interest groups. Monitoring and controlling of the objectives / sub-objectives.
5.level	External communication strategy	External communication of the targets for *Mission Zero Emission*. Communication of progress made, adjustment of basic target lines if necessary.

Mission Zero Emission was planned as a comprehensive program from the outset. All global production sites were asked to nominate project managers who would be responsible for local implementation. The project management itself was set up by the communication process as a top-down flow and bottom-up aggregation: The respective project managers of the production sites had extensive freedom to decide how the necessary implementation must first be carried out for the decarbonization of the respective site, considering the respective legal and cultural constraints. The site-specific project managers are thus empowered to make the necessary decisions to achieve the targets themselves. Reporting is carried out bottom-up to the PMO, relevant committees and top management.

The net zero target is set by the company management, and the sites are expected to achieve this target cumulatively. The requirements and business objectives therefore flow from the company's stakeholders to the program managers, from there to the country managers, from there to the business managers and finally to the project managers. This is shown as an overview in Fig. 3.

Figure. 3: Top-down flow and bottom-up aggregation for the realization of Mission Zero Emission



4 PMO as a central control unit

A PMO was established in Germany to manage, monitor, and control this demanding program. Each production site is defined as the lowest basic level and management is the highest level.

Structures also exist as business units that encompass several production sites. The PMO now has the challenging task of managing the communication of the aggregation strategy with feedback and synergies between the sites, the business units and all those responsible.

The *Mission Zero Emission* program has been divided into three phases for the period up to 2040. These are intended to provide a time frame for each location in which the individual projects are to be initiated, planned, implemented and, if possible, completed.

Phase 1 was defined for the first two years. The degree of fulfillment for this phase was set at 95%. In terms of content, this phase involves the initialization and planning for all production sites about all documentation required in a project charter and the subsequent detailed planning as a basis for the subsequent implementation in phase 2 - planned for five years - and phase 3, which is scheduled for seven years. Phase 2 leaves sufficient scope for changes to the content and cost framework for the respective project and phase 3 is defined as a kind of *placeholder* in which new, innovative ideas are welcome and can be considered for implementation.

In addition to supporting the sites for the respective phases described above, the PMO continuously communicates with the respective production site managers all specifications and special features, the measures and procurements required for the realization of each site. These are shown in an overview in Table 3.

Table. 3: Top-down flow and bottom-up aggregation for the realization of Mission Zero Emission

Requirement profile	Production site-specific requirements. Recording and management of change requests for the requirements.
Resources	What manpower and capital resources are needed and when?
Technologies	Which technologies need to be used when to achieve the site-specific project goals?
Legal/social requirements	What legal framework conditions need to be observed for specific locations? What social requirements must be observed - e.g. in terms of occupational safety, etc.?
Procurement	When do which systems / equipment etc. have to be procured? When do they have to be provided?
Research & Development	Which technologies may still require R&D processes for their use? By when must these deliver results?

5 PMO for *Mission ZeroEmission*: management, monitoring and controlling fully digitalized.

For the example described here of a company with more than one hundred production sites worldwide, program management, monitoring and controlling is not possible without the use of structured, specific digital tools. The company uses an extensive pool of digital tools and visualization dashboards for this purpose. The entire digital system is based on the resources of Microsoft technologies and uses SharePoint and the applications available with it.

All top-down strategies are only a means to an end to achieve the net zero target, but the real impact and importance must be at the grassroots level - at the production site. With this approach, it is difficult to track real progress when multiple streams of information from different sites are available in different standards. Standardizing data collection and aggregating data at different levels is the best approach here to track progress.

The granularity also allows data to be aggregated by business unit, country, region or company and, if necessary, a mixture of different locations. And the aggregation of all locations provides the company's overall key figures.

A database-supported knowledge management system is used for the top-down approach and controlled via the PMO. The data obtained is made available to all relevant program participants. This includes communicating the business objectives, the currently available technologies, and their performance parameters as well as their advantages and disadvantages, the roles and responsibilities, the estimated capital and operating costs, the available providers of the technologies or any necessary R&D, etc.

All this information is provided digitally with a robust access management system. SharePoint is linked to PowerBI, a reporting, data analysis and visualization tool, to facilitate the use of the data. The program management team maintains the digital knowledge base. It is essential to capture and keep all data up-to-date, accurate, complete, and reliable.

The system enables collaborations in which anyone who has relevant data can share it with others to make it available to the entire company in a peer review process for quality and correctness. Production sites that want to implement a technology that has never been used at company level before must see themselves as lighthouse projects for this technology and make the knowledge and experience they have gained available. As these sites are taking a higher risk with the new technologies, they must be comprehensively documented in both technical and economic terms. The knowledge gained in this way will be used to further develop solutions where necessary.

5 Conclusion: Digitally controlled sustainability management

Finally, there is an overview of how the management for the *Mission Zero* program is designed and implemented. The top-down flow, the bottom-up aggregation and the monitoring and controlling for the implementation and the intermediate stages achieved can only be carried out for a program of this size with the support of digital tools as described above. Program-specific dashboards and control instruments were developed individually for this purpose. These are presented in an overview in Table 4.

Table. 4: Tabular overview of the digital control instruments

Project management methodology	Agile project management methods are primarily used for implementation. Support tool: Jira (Atlassian)
Digital project plans	Project charters and project plans are developed and implemented on a site-specific basis. Three dimensions are to be taken into account, which are made available from the individual locations and processed by the PMO: Project-specific status information, impact assessment of the implementation measures, progress indicator of the measures to achieve the sustainability goals (here primarily decarbonization).
Data insight and visualization	Visualization of KPIs across all production sites.
Glide paths and trend lines	Progress control via comparisons across locations between historical and future developments. Corresponds roughly to a burndown chart.
ZeroEmission Visualization	Quantified presentation of the gaps between decarbonization already achieved and the defined target. Site-specific basis for further decisions on which technologies to use.
Management reports	Dashboard for all management levels to visualize progress Production sites must have planning updates approved annually, among other things. Management dashboards ensure a complete overview.

It should have become clear that all aspects relating to ESG criteria and their implementation within organizations are primarily the strategic decision of management. Subsequently, the implementation plan with all the necessary specifications must be drawn up and the organizational prerequisites created. Operational management in the form of project management is crucial to the success of implementation. Above all, it is necessary for the project management and its executors to understand all sub-projects of this extensive and ambitious program over a period of more than ten years.

This makes each individual project manager the shaper of the future for their respective location. The PMO set up as a central control unit is the spider in the web for cooperation, communication, monitoring and controlling implementation.

Parallel to this decarbonization program, measures are being taken to further develop the company's entire product range in the direction of sustainability.

The future can be shaped. Corporate leaders must have the courage to do so. One World-Our Responsibility.

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This Work has Relation to the SDG's 9 and 12 (https://www.un.org/sustainabledevelopment/):


9
INDUSTRY, INNOVATION AND INFRASTRUCTURE
12
RESPONSIBLE CONSUMPTION AND PRODUCTION