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THE DECOMMISSIONING GAP

Decommissioning and Re-Use Challenge for the Energy Transition

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The presentation, and the presentation slides, will be in German language.

ABSTRACT

Decommissioning has traditionally been seen and managed as an end-of-life technical challenge, far from a company's core business, and of limited significance to others. The nuclear industry has extensive experience addressing this challenge, and can serve as benchmark for other sectors – but it must prepare to meet new expectations:

Decommissioning and re-purposing of old and stranded assets, all along the entire up- and downstream value chain of the "old energy system", in a resource-constrained environment, are coming to increasing attention of financial market players and other key stakeholders as a critical, holistic part of the energy transition.

Accordingly robust, sustainable pathways for decommissioning and the corresponding liabilities become a new strategic imperative for asset owners and their supply chain – including in the nuclear industry.

INTRODUCTION

Decommissioning is usually seen and managed as an end-of-life technical challenge, far from a company's core business, and of limited significance to others. However, decommissioning of the "old energy system" all along its entire up- and downstream value chain is now being recognised as a critical, holistic part of the energy transition.

In particular, decommissioning liabilities are increasingly coming to the attention of financial market players and other key stakeholders. The establishment of robust, sustainable pathways for decommissioning and re-purposing of old and stranded assets becomes both a regulatory and strategic imperative. Only companies that have identified and addressed their decommissioning obligations across their entire asset base and reflected the risks and opportunities in their business model, will have reliable access to capital and the opportunity to leverage their operational assets and processes towards a greener future.

In the developing new decarbonized, digitalized, decentralized, democratized ("4D") energy system, incumbent market players compete against each other as well as against new market entrants. In this competition, existing assets are a "millstone" that can be valuable or a burden: Owners who manage their decommissioning "millstone" well, will benefit from having a headway in the market – those who manage it poorly will be dragged down.

RESULTS

Recognize the paradigm shift

In the EU as in other industrialized countries, policy makers and industry are focused on the future "4D" energy system and the urgency to forego the old system. As we discuss "bridge technologies", extending fossil capacities as gas, and weigh options such as nuclear, we begin to realize the critical holistic challenge that our companies and our society face as we move forward. The new energy system will need the sites, infrastructure, resources etc. that are still used by the old energy system.

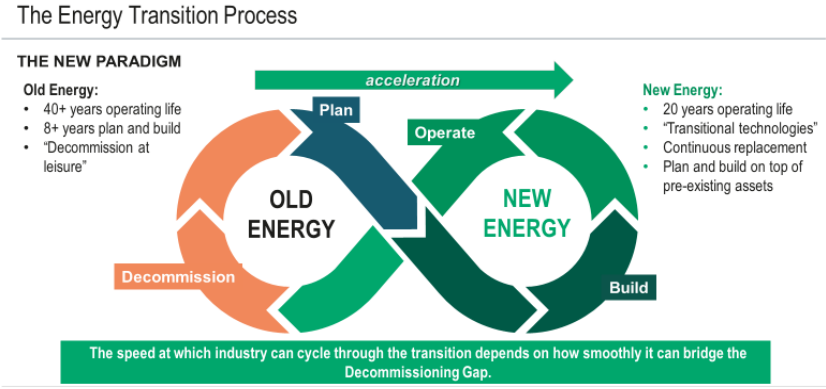

Figure 1

In this context of the energy transition, where the entire existing global energy system is to be decommissioned and replaced within the next ten to twenty years, we refer to the challenge that decommissioning and repurposing of sites and their infrastructure represents as the "**Decommissioning Gap**".

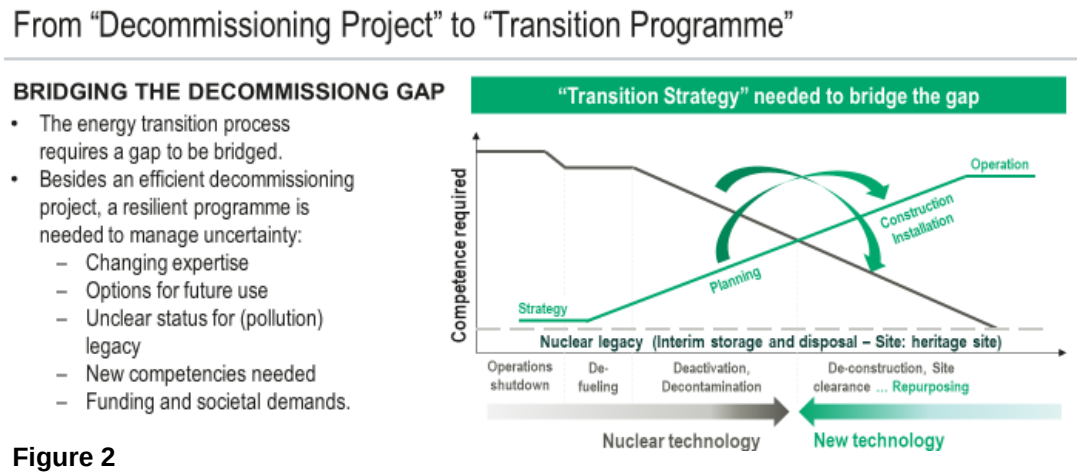

Figure 2

In this context it is also important to note that the transition, and site repurposing, is not just about energy, but all aspects of the 4D's and issues even beyond those. Creating digital competencies; establishing new facilities (e.g. datacenters with reliable high capacity energy supply; logistics centers for future mobility solutions by road, rail, water and air; etc.); providing suitable space for commercial, industrial and residential solutions and even re-naturization: all require similar space and resources.

What is the consequence?

Dealing with shutdown, decommissioning and life-time extension and re-use as well as new build in parallel and on a large scale, industry wide, is a drain on resources and involves potential conflicts of interest (e.g. future site uses, overlapping supply chain and logistics needs) and high degrees of uncertainty. Importantly, industry is faced with a triple financial (cash-flow) burden:

- stranded assets no longer earn income,
- but cost money to decommission,

- while new business models require new investment in the new energy system.

Globally, the Decommissioning Gap needs to be recognized as a multi-trillion Euro financial challenge and key factor in the critical chain towards the new energy system.

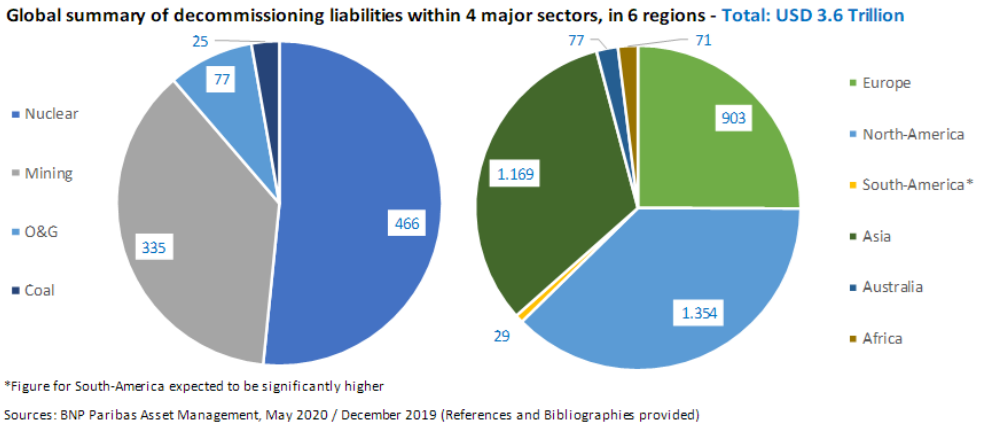

Figure 3

Significantly, the financial industry (investors, lenders, rating agencies) has become increasingly sensitive to the Decommissioning Gap, making it a competitive, and in some cases existential, challenge: asset owners who cannot demonstrate they have identified and addressed their decommissioning liabilities sustainably will have difficulty with access to equity and debt; others who have done so well can leverage their programme as green investments.

This is new because it makes what was previously an internal “PULL” challenge (where asset owners pull on strings to get things done) to a powerful external “PUSH” (where asset owners are pushed to get things done in a particular way) confrontation.

As decommissioning and repurposing gains more attention, and new questions are asked in new ways, this can be expressed as a holistic challenge in Four Dimensions, Society-Finance-Corporate-Industry:

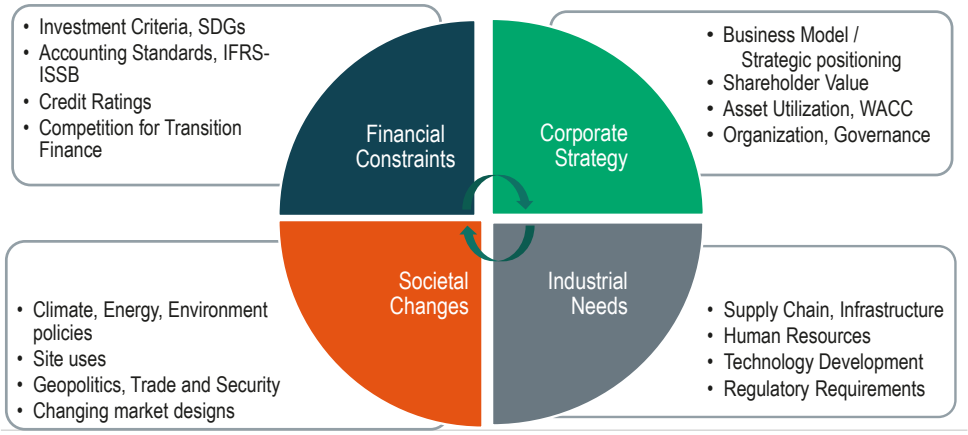

Figure 4

In responding to this challenge, some key issues that must be addressed are:

- What are investor expectations for diligent valuation of decommissioning liabilities and what needs to be done to meet them?
- What are options and requirements to secure funding, in line with long-term sustainability and optimised investment strategies?

- How to plan the re-purposing of existing infrastructure future use cases (alternatives and their value to owner and to stakeholders, technology and execution, etc.)?
- How to guarantee successful performance of the decommissioning and re-purposing process in a resource-constrained industrial environment?
- What are the implications for the corporate business model, governance framework and organization?

Nuclear gives a good example:

> In comparison to decommissioning in many other sectors, the nuclear industry has benchmarked project cost models within a dedicated regulatory and industrial framework, with funds earmarked.
>
> Yet in most cases, nuclear decommissioning requires green/brown-field end-states and is not usually designed for fast optimized site/facilities reuse. Plans are based on one-off projects (at best within a corporate/regional fleet approach) and often do not consider market dynamics of the coming Decommissioning Gap, such as resource constraints:
>
> - human resources (owner, suppliers, regulators)
> - supply chain capabilities (know how and certifications)
> - site logistics and infrastructure (laydown areas and other buffer storage, transport, disposal of non-radioactive bulk waste materials etc.).
>
> Even when contracts are in place to cover these constraints, those contracts are often not stress-tested in accordance with other unfavorable experience in nuclear and other megaprojects.
>
> In many cases and in many ways even nuclear liability funds are not fully consistent with best practice in financial markets (i.e. investor expectations), let alone as these become a major strategic focus area and industry develops a holistic approach to assessing and funding its back-end liabilities.

If even the nuclear “best in class” benchmark is deficient, the non-nuclear challenge is even greater. While the individual technical/financial issues at e.g. fossil or first-generation renewable sites are much smaller than in nuclear, the total number of sites is greater and includes not just utility power generation assets but also industrial energy facilities.

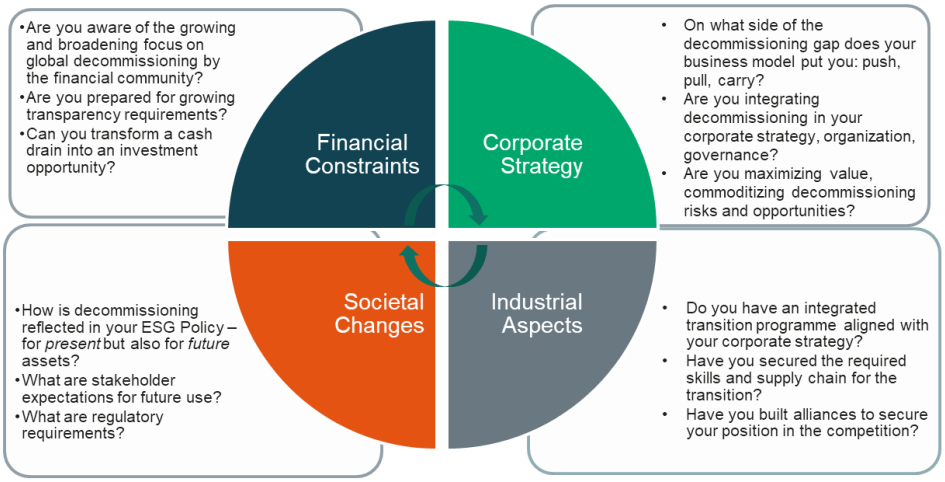

Figure 5

In result, when questions as above about decommissioning and repurposing are addressed in a holistic way, the answers that may have been satisfactory in the past may not be sufficient moving forward.

CONCLUSION

Asset owners should perform an internal assessment of their integral corporate decommissioning and repurposing needs and potential.

The assessment should begin with a top-down approach, across all asset classes (nuclear, coal, renewables, infrastructure, mines, etc.) that are or will be affected in the energy transition. It could then break that down to determine possible future site/facility needs, define the decommissioning and repurposing process under VUCA conditions, identify ways to minimize resource loads, how to expand and secure access to resources; and how to "package" this process as sustainable "green" investment.

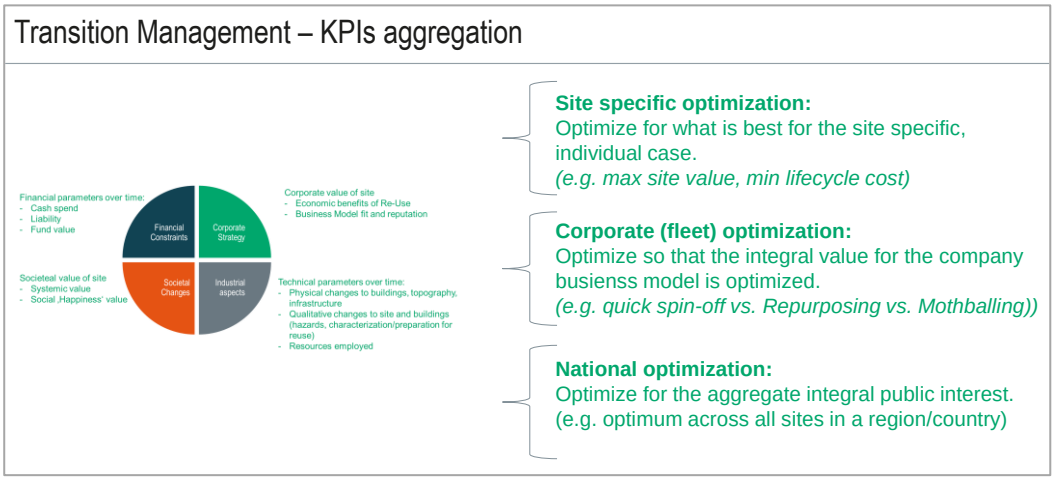

Figure 6

An important question will be, which sites (or parts of sites) should remain with the original owner. Other parties may be better suited to perform the decommissioning – e.g. as part of a specialized decommissioning business – or better suited to re-use the sites after decommissioning. Where a site transfer would be beneficial, the question becomes when and how the transfer can be accomplished and how risk and responsibility for legacy issues are allocated. In the U.S. even nuclear decommissioning sites including their licenses and their financial provisions have been transferred to third parties; the licensing authorities recognized the new ownership may indeed be beneficial for the public good. These questions become very important also with regard to new renewables projects, where the local community will seek assurances that funding and responsibilities for future decommissioning will be safely in place.

The assessment should proceed in several iterations, with two perspectives:

Strategic: In order to maintain a company's competitive position, in particular with regard to financial needs, its **business model** must be transparent and offer auditable answers to the Decommissioning Gap: both in the context of the own inherent challenges as well as in the global context (competitors and suppliers): what is the journey from existing assets (impaired sites/facilities) to future operating sites?

Operational: In line with the strategic need, the **operational approach** must assess the technical requirements and limitations, risks and opportunities, create cost and cash flow models underwritten by the supply chain, and develop programme designs how to minimize resource needs on the path towards uncertain future needs, while considering that the future state of the art is uncertain.

Such an assessment could be supported by experienced third parties to contribute an independent view on corporate, financial, compliance requirements; have access to global best-in-class know-how with old and new technologies; perform peer reviews; and support the implementation of findings – including possible co-ownership of new assets and activities to be developed in the transition programme.

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