



**THE
POWER
MARKET**

A Complex Equation Requiring
Difficult Decisions

BACKGROUND

The expected rapid growth in electricity consumption in Sweden, Nordic, and worldwide, in pursuit of a fossil-free society, presents significant challenges for adapting the power system to these changing conditions. Achieving this goal requires identifying and implementing measures that optimize the transition to a more sustainable energy system. A holistic approach that considers the intricate interplay between energy sources, grid infrastructure, and energy consumers is necessary. Furthermore, to ensure a smooth transition, clear goals must be established, prioritizing investment in clean energy, and fostering innovation and collaboration among energy sector stakeholders.



THEME

Cappgemini Invent's market study, conducted among energy companies in the fall of 2022, revealed that the willingness to take responsibility is present, with a focus on flexibility and its development. However, there are concerns about the stagnation of permit processes for grid expansion and new electricity production. Respondents suggest that, for the next 20 years, the energy sector will have to rely on current production technologies, as the contribution of new technologies will be limited. For example, the contribution from wave power and next-generation nuclear power.

One of the specific issues that arose concerns among the respondents was non-regulatable electricity generation included in the power balance. Without a fuel price as a basis for pricing and a large share of non-regulatable production, a big difference between power shortage with peak prices to surplus and near-zero prices in the spot

market may occur. This can partly be solved by using flexible solutions, but it is not the entire solution.

Some respondents expressed concern about the calls for re-regulation, primarily within the EU, as some believe that the market will not solve the problems that will occur. Instead, they suggested requiring actors who deliver electricity to customers to either have their own generation or instead long-term purchase agreements with generators as a guarantee of being able to deliver. This would create a power market that makes it possible to invest in power reserves even if the operating time for the relevant resources does not cover the long-term cost of revenue from actual energy sales.

Respondents agreed that all forms of resources must be utilized to solve the power issue. They suggested creating a separate power market requiring suppliers to have supply in order to be able to offer customers electricity

delivery, as it would create a power market that incentivizes investments. All forms of flexibility are beneficial, including large-scale solutions that can handle longer shortage periods, but also take care of the surplus energy that arises at other times. Suggested solutions for this would be hydrogen hydrolyzers or pump storage power plants.

Finally, respondents highlighted the problem of aligning regulatory needs and pricing for flexibility at different levels in the power grid. The respondents also expressed a lack of investment willingness and risk capital availability, as well as significant concerns regarding permit processes and the power grid's ability to handle expansion rates. The current market model's support for energy expansion and its failure to solve the power issue are also concerns, but not seen as impossible to solve.

WAY FORWARD



To address the power problem, it is crucial to develop a market model that provides transparent revenue streams for investments in power capacity. While political support for new nuclear power exists, it alone cannot solve the problem. Partly as a significant expansion still would result in a large percentage of total electricity production coming from non-regulable renewable sources. However, policies can support with incentives and favorable regulation, but the industry must come up with investments and innovations to solve this problem.

Managing the Swedish electricity system, even in its current form, is a complex algorithm that has worked well since before deregulation in the 1990s. However, the expected growth of over 100 % in just a few years, coupled with the simultaneous withdrawal of fossil fuel power, which has been a stabilizing factor even in Sweden, puts the existing system

under pressure. Fortunately, we have the technical resources such as artificial intelligence and machine learning to create an overview and control of the complex challenge that the future electricity system faces. However, given the increased number of actors who invest, the decision-making processes have become more complex, making it difficult to understand and grasp the future electricity system that the algorithms should handle.

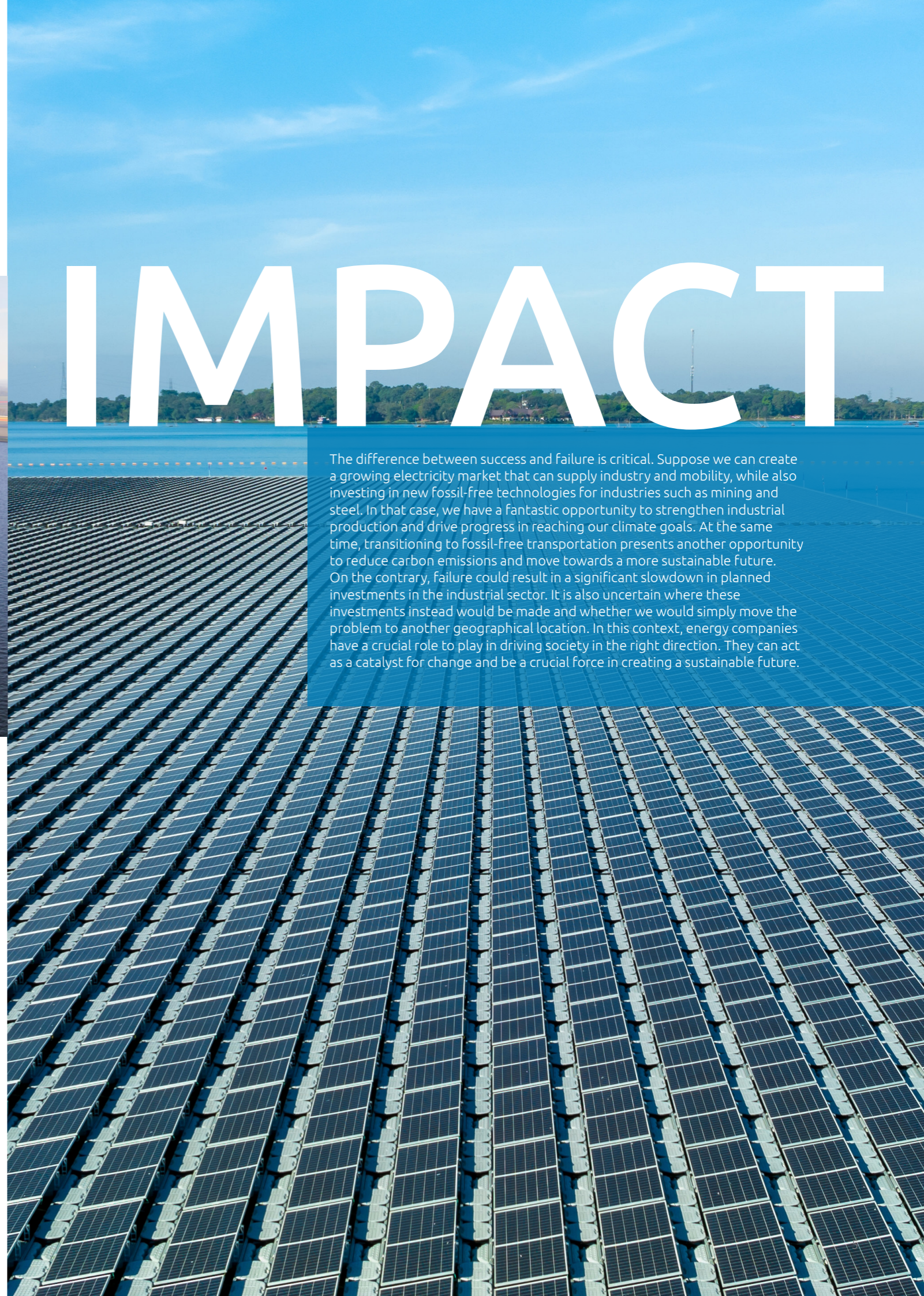
To enable expansion, it is essential to create faster and simpler permit processes for both electricity production and electricity grids. Additionally, it is important to create an understanding that the equation with maintained or increased welfare, reduced greenhouse gas emissions, and no projects that affect our nature does not add up. There will inevitably be trade-offs that need to be made.

Considering these challenges, the following implications emerge:

- There is a great need for massive IT investments to effectively manage governance in a complex system, enabling all customers and stakeholders who can contribute to solving the power issue to participate
- The current market model needs to be reviewed and adapted to address the power issues
- To create acceptance for necessary investments, policymakers and scientists must objectively and clearly describe the challenges we face in a pedagogical manner, emphasizing the importance of investing in solutions

IMPACT

The difference between success and failure is critical. Suppose we can create a growing electricity market that can supply industry and mobility, while also investing in new fossil-free technologies for industries such as mining and steel. In that case, we have a fantastic opportunity to strengthen industrial production and drive progress in reaching our climate goals. At the same time, transitioning to fossil-free transportation presents another opportunity to reduce carbon emissions and move towards a more sustainable future. On the contrary, failure could result in a significant slowdown in planned investments in the industrial sector. It is also uncertain where these investments instead would be made and whether we would simply move the problem to another geographical location. In this context, energy companies have a crucial role to play in driving society in the right direction. They can act as a catalyst for change and be a crucial force in creating a sustainable future.



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