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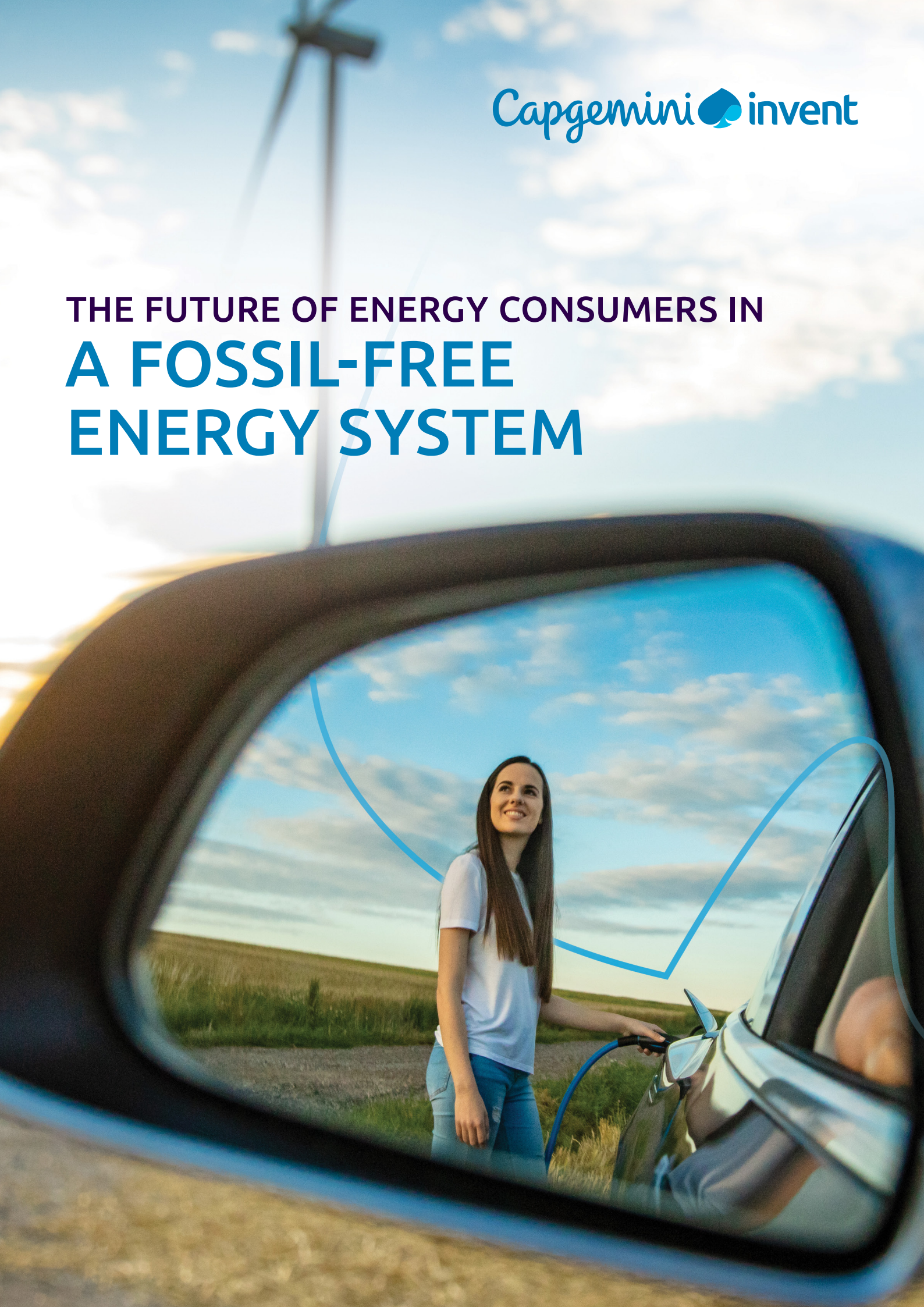
THE FUTURE OF ENERGY CONSUMERS IN A FOSSIL-FREE ENERGY SYSTEM



The energy landscape is undergoing a profound transformation as the world shifts towards a more sustainable and renewable energy future. Gone are the days when energy customers were passive consumers, simply using the energy produced by others.

Today, the energy customer of the future is expected to play a critical role in the transition to a fossil-free energy system. One area where customer participation is essential is in the flexibility market, which has been identified as a key aspect of the energy transition. Numerous reports, including Svenska Kraftnät's LMA 2021 (long-term market analysis) covering the period until 2050, clearly highlight the need for flexibility in electricity usage by customers to prevent power shortages and stabilize the grid. One might argue that additional nuclear production could solve this problem, but it is important to note that renewable energy sources are expected to become an increasingly significant part of the overall energy production mix. This is demonstrated by two potential scenarios outlined in Svenska Kraftnät's LMA 2021 outlook. Therefore, simply ramping up nuclear production will not be sufficient to address the power shortage issue in the long term.

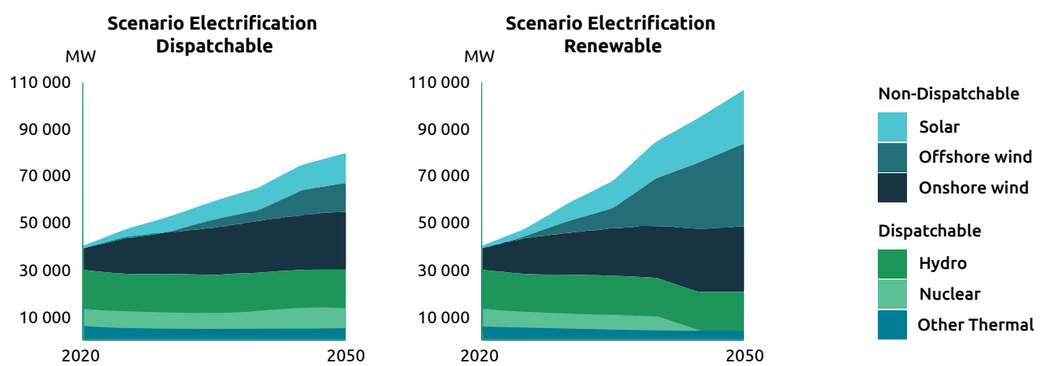


Figure 1: Production capacity by type of power according to Svenska Kraftnät's LMA scenarios. The dispatchable scenario implies that renewable production expands together with maintained or increased dispatchable production. The renewable scenario implies that mainly renewable production expands, while thermal production decreases. Notice that the share of non-dispatchable production will be relatively high even if nuclear power is maintained or expanded.

To prevent power shortages, it is essential to incorporate regulatability and flexibility into both the consumption as well as the generation side of the electricity equation. This can be achieved by providing economic incentives for consumers to adjust their energy use when needed, while also making it easy and convenient for them to do so. It is important to minimize the impact on consumers' daily lives and to ensure that industries are not adversely affected more than the revenue generated by flexibility trading can compensate. By prioritizing simplicity, profitability, and fairness, a sustainable and reliable energy system can be created that benefits everyone.

However, simply demanding flexibility from customers will not be enough to unlock the full potential of flexible energy resources and products. Instead, these devices must work together in an optimized way to fully realize their potential. This requires aggregating them into a larger unit, which involves collecting, presenting, and controlling flexible production or consumption at a local and national level. Aggregating energy resources and products requires not only technical expertise but also a sizable order book and customers who are willing to accept delivery at a predetermined time. For example, an electric vehicle charger made available to the flexibility market must be connected, actively charging, and able to adjust the charging power to meet the energy needs of the moment. This underscores the importance of having appropriate technology in place and the ability to match energy supply and demand in real-time, which is critical for creating a sustainable and efficient energy system.

SURVEY

In the fall of 2022, Capgemini conducted a survey among energy companies, revealing that there was a strong consensus among them – that providing customers with flexible offers is a critical requirement for an electricity supplier to remain relevant to its customers. Flexibility offers can for example be control of heat pumps, EV charges and solar panels combined with battery storage, among others. Some companies have already launched their first products, while others are still exploring ways to create products, either independently or in partnership with others.

The survey indicates that a partnership between an electricity retailer and a third-party aggregator is likely, with the aggregator seen as a supplier of systems for controlling aggregation rather than as an entity that interacts with individual customers. By doing so, energy companies can leverage the technical expertise and resources of third-party vendors while retaining their connection to customers, ultimately creating a more comprehensive and customer-focused approach. Respondents from the survey identified electric vehicle charging as an example of an area where flexibility offerings could start, batteries (either standalone in-house batteries or in conjunction with solar panels) were also cited as a potential area of focus. *"The battery will be a part of our standard delivery package".*

According to the respondents, for flexibility offerings to be successful with customers, they must be user-friendly and offer clear economic benefits. Mere willingness to contribute to climate goals and accept comfort sacrifices is insufficient. *"Customers want security. Simple, convenient solutions that allow them to optimize their economy".* One respondent describes it as *"just offering an electricity retail contract today is almost a hassle",* expressing increased customer awareness. But some also stress that the importance of economics for the customer must not be overestimated, with security and comfort being more important.

But if the flexibility market is so important, why haven't all companies developed products for it? One challenge is the limited size of today's market, making it difficult to develop new profitable offerings. Another challenge faced by energy companies is their struggle to innovate, as their core competency lies in managing operations rather than developing new products and services. Additionally, their business model and organizational structure may not encourage an innovative mindset, making it difficult for them to adapt to changing market demands. The reasons for this current situation for many companies in the energy sector can be traced back to the fact that the energy market and consumption patterns have remained largely unchanged for a long time. The traditional customer organization and IT infrastructure were primarily designed to serve the conventional electricity sales model, making it difficult for them to cope with the complexities of the modern energy market. Customers today, and in the future, demand a range of flexibility services and can even participate in several markets simultaneously. In fact, retail customers are already transforming from being just energy buyers to also selling energy by owning solar panels and batteries. The development of a flexible energy system is still at an early stage and there are several hurdles to overcome, such as achieving seamless integration between the customer, the electricity trader, the grid companies, and the aggregator.

The flexibility need is not only on the national level – it could also be extremely local. One part of a local grid can have peak problems due to an oversupply from solar panels on a sunny day. At the same time, new consumption cannot be allowed in another part of the local grid due to bottleneck problems. Therefore, the requirement for flexibility will occur in different places of the electricity grid and affect many network companies not only the electricity trading companies, as they may become buyers of flexibility services from their customers. However, some respondents feel that industry players are hindering customer interest by not being prepared to offer complete solutions.

"It is a misconception that the market cannot take off. In fact, if we create a market and develop suitable products, I am confident that it will start to grow"

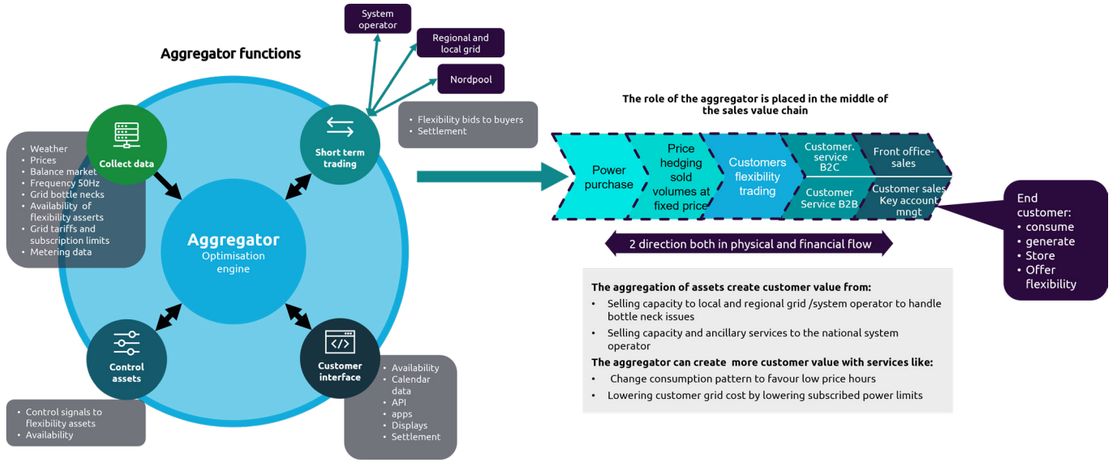
Many respondents raised concerns about the need for new skills and the ability to retain expertise within companies. "Upskilling" should occur at both the technical and strategic/ management levels. Although partnering with other companies is a good strategy for addressing new customer needs, we cannot be completely ignorant as customers ourselves. We must have some knowledge about what we are ordering.

OUTLOOK

The electrification transition is not only placing new demands on actors in the electricity market but is also leading to the integration of various sectors and industries in a way that has not happened before. The most obvious example is the integration of the electricity market and the automotive industry. By 2023, solutions for Vehicle-to-Grid (V2G) will already be available, which means that electric vehicles can not only be charged when it is most advantageous but can also be used to manage the frequency of the electricity grid. Since very few people have a need for a fully charged battery that can reach 400 to 500 km of driving at any given moment, connecting the car's charging to one's planning calendar can be done without any worries.

The question then becomes, who is most suitable to manage this? Is it the electricity company, the car manufacturer who provided the car and the car battery, or an external part? Some of the major car manufacturers are already developing large-scale solutions that have not yet been launched in Sweden. For example, one OEM has started a subsidiary that's collaborating with a network company to practically find solutions for consumers to use their vehicle as a storage unit. Today, there are also electricity retailers owned by the automotive industry that offer their customers both **"regular"** electricity supply agreements as well as agreements with substantial discounts where the electricity company controls the charging of the electric vehicle.

THE ROLE OF AN AGGREGATOR AND IMPACT ON CUSTOMER INTERFACE

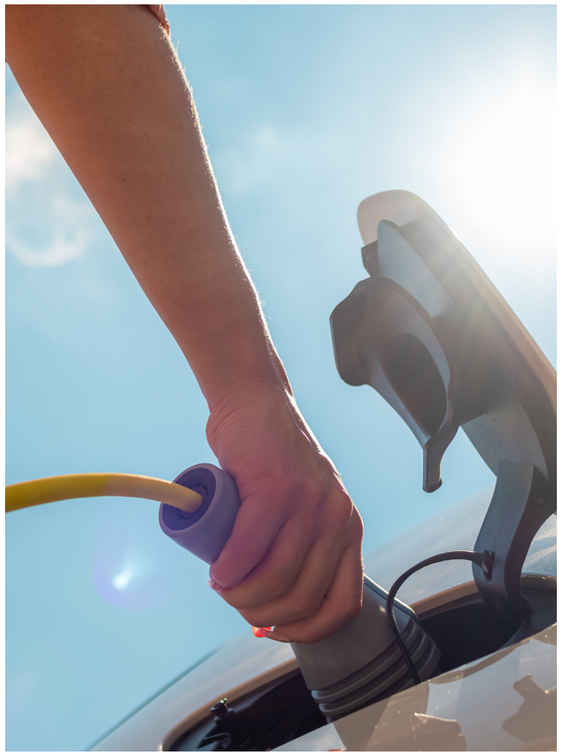


The aggregation of assets create customer value from:

- Selling capacity to local and regional grid /system operator to handle bottle neck issues
- Selling capacity and ancillary services to the national system operator

The aggregator can create more customer value with services like:

- Change consumption pattern to favour low price hours
- Lowering customer grid cost by lowering subscribed power limits



We foresee a rapid evolution where traditional electricity retailers could not only miss out on aggregator and flexibility services, but also lose their grip on the traditional electricity retail business. The responders of the conducted survey have emphasized the importance of understanding and optimizing flexibility from various sources such as hydropower plants, vehicle batteries, and industrial processes. Although this relates to the role of the balance provider, it does not necessarily include the role of supplying electricity to the end-user. With this outlook, we expect that larger balance providers will strengthen their position while customer relationships will be shared among multiple actors. These actors can reach customers with uncomplicated, convenient, and value-enhancing offers that do not solely revolve around electricity contracts. But the aggregator role will in any case break up the old value chain and take a position either with a direct customer interface or through a retailer.

Achieving success in this landscape will also depend on how a customer's supplier and partner manage issues related to privacy and data sharing. Although this topic may not yet be a pressing issue, we anticipate that concerns will arise as people become aware that connected cars and continuous electricity consumption measurement can map customer behavior and lifestyle patterns in detail. As a result, will customers accept the intrusion of electricity companies or other entities into their private space? Is this a sacrifice that customers are willing to make to combat climate change?

IMPACT

The traditional way of looking at electricity sales is electricity as a commodity with a market price that is sold to customers with a margin that covers both administrative costs and profits. However, with the transition to a fossil-free energy market, energy companies must adopt a new perspective on electricity and become more involved in the customer experience. This includes convincing customers to participate in the transition to a more sustainable energy market, which can be challenging, as customers may be hesitant to change their current behavior. In addition, energy companies must establish themselves as the natural partner for the customer on the customer side of the electricity meter, which requires a more customer-centric approach.

To succeed in this new business landscape, energy companies need to understand the new landscape and develop a well-defined strategy that aligns with their business goals. This includes choosing which part of the market to focus on. It is also important to attract and retain top talent and create a culture that supports innovation and the development of agile operating systems and entirely new business models.

By doing so, energy companies can position themselves as leaders in the transition to a fossil-free energy market and gain the trust of their customers, who are increasingly looking for sustainable energy solutions.

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