

How to exploit the huge market potential





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FOREWORD



Dear Reader,

The energy transition is in full swing, and the market for decentralized energy is growing. With climate change progressing, there is increasing pressure to find sustainable solutions for energy supply as quickly and effectively as possible. In the wake of the current energy crisis, energy independence is also becoming increasingly important. These political and social drivers have, in conjunction with digitization, led to a change in the way value is created on the energy market.

A one-way energy flow from central energy producers to end customers has been transformed from a linear value chain into a highly digitized energy system that places end customers at the center of value creation. The home is becoming the main arena for the energy transition.

Today, it is primarily hardware manufacturers and distributors, as well as installation companies that are benefiting from the boom in demand for photovoltaics (PV), heat pumps, energy storage systems and EVs. In the long run, however, only those companies that think holistically and link the electricity, heating and e-mobility sectors will be able to survive.

At Kiwigrid, we develop the appropriate software for this. With our product The Independent Home (TIH), we also offer a home energy management system (HEMS) that opens up new market opportunities for system distributors, OEMs and energy service providers with numerous benefits for their end customers.

We believe in a world powered 100% by renewable energies. With our products, we want to invite as many people as possible to help shape this necessary change and contribute to the success of the energy transition. If you are also thinking about entering the energy market with your company or you want to develop your business in this area, you should keep reading. This e-book will give you an overview of the opportunities offered by a HEMS and why the market for energy management solutions is so promising.

Wishing you a good read,

Dr. Frank Schlichting - CEO, Kiwigrid

DEVELOPMENTS IN THE ENERGY SYSTEM REQUIRE NEW SOLUTIONS

A NEW ENERGY SYSTEM IS EMERGING

About 20 years ago, the energy system looked very different than it does today. The old energy system was based on a centralized power plant and grid infrastructure. Since then, the emergence and expansion of renewable energies has brought about a rapid development. Energy is now largely produced and supplied decentrally by many small, decentralized plants. For example, an increasing number of PV systems are producing electricity on the roofs of homes. For this sustainably generated electricity to be used as widely as possible, various sectors that were previously based on the combustion of fossil fuels are being electrified. This development can be seen, for example, in the heating and mobility sectors: sales of heat pumps almost doubled from 2017 to 2021 (from 78,000 to 154,000). The number of new registrations of EVs has increased more than tenfold within the same period (from 25 056 to 355 961).



The timeline from 2000 to 2050 shows how the degree of flexibility has shifted for large plants, for smaller plants, and for demand response.

POLITICS IS DRIVING DECENTRALIZED CHANGE

The trend toward decentralized energy generation is already in full swing and will intensify in the future. Policymakers are vigorously driving this change forward. With the *European Green Deal*, the EU has adopted a policy package that will further accelerate the shift to a decentralized and CO2-neutral energy system. The Green Deal is built on four pillars, all of which emphasize the growing importance of HEMS:

- **Higher share of renewables:** The integration of renewables into the energy system is not possible without intelligent feed-in management through energy management systems.
- **Electrification of the mobility and heating sectors:** The electrification of the mobility and heating sectors is advancing at a rapid pace. It is the most important driver for sector-coupled energy management systems.
- **Smart energy infrastructure:** Driven by increasing electrification, the long-discussed topic of smart grids is gaining momentum. The integration of local energy management systems is mandatory for smart grids.
- **Participation of all citizens:** Energy communities, intelligently managed by energy management systems, can make the energy transition accessible to all citizens. However, due to the still very complex regulations, this is not yet a market driver for energy management systems.

THE VALUE CHAINS IN THE ENERGY MARKET ARE CHANGING

In the past, hardware components (PV systems, storage units, EV chargers, heat pumps) and electricity were always sold separately. As a rule, the hardware was sold via a two-stage distribution chain. For example, the final sale of a PV system was done by a PV installer and the final sale of an EV was done by a car dealership. Today, the market is still highly fragmented, but there is increasing convergence at all levels of distribution. There are initial providers that combine up to three domains. For example, this could be a mobility-centric provider of energy solutions that not only offers EVs but also EV chargers and a matching electricity tariff.

We believe in the long-term success of energy solution providers that drive sector coupling and offer a seamless shopping and product experience to their end customers. The key to decentralized value streams lies in developing applications that take advantage of sector coupling. For this, a HEMS is indispensable. The stronger the sectors are connected, the greater the benefit for the end customer.



We believe in the long-term success of energy solution providers that drive sector coupling across all domains and provide a seamless shopping and product experience for end customers.

THE MARKET FOR DECENTRALIZED ENERGY SYSTEMS IS GROWING

The untapped market potential for private decentralized energy systems is already huge, and massive growth of decentralized energy plants is expected. Over 100 million single- and two-family homes in Western and Northern Europe (and hundreds of millions more worldwide) will contribute to the energy transition over the next 30 years. In total, according to our calculations, the energy transition in the home amounts to a 12-trillion-euro market that needs to be tapped:

- 100 million homes spend a total of 80,000 euros each on PV systems, energy storage, EV and heat pumps over their average 20-year lifespan.
- The one-off acquisition costs for hardware add up to a market volume of 8 trillion euros.
- The average annual residual electricity costs and revenues from flexibility marketing in the same period amount to 2,000 euros per year.
- Continuous returns result in a market worth 4 trillion euros.

SECTOR COUPLING BECOMES THE MAIN TASK

With the growing decentralization of the energy market, the number of devices inevitably increases. So far, there have often been separate installations of the devices. The PV segment dominated with over 50 percent, while heat pumps and charging stations were also among the most relevant installations. Common to all devices is that their effectiveness increases when they are linked together. Therefore, multi-asset installations are becoming more important.





In 2030, the residential decentralized energy market will be dominated by electric vehicles and sector-coupled energy systems, making a HEMS essential.

Already by the year 2025, it is expected that the share of sector-coupled systems – i.e. at least two linked devices – will grow strongly. A sector-coupled system can, for example, be a combination of PV system and charging station or PV system and heat pump. Use cases that only involve the management of a single energy system will become increasingly rare in the future, while integrated use cases will become the new standard.

As early as 2030, the market for decentralized energy supply will be dominated primarily by electric vehicles and sectorcoupled systems. The more complex the decentralized energy world becomes, the more crucial it will be to manage it intelligently. The increasing proportion of linked energy systems makes a home energy management system (HEMS) indispensable. This is because the energy transition can only be successful if it is customer-centric and easy to manage for end customers. This is only possible with a manufacturer-independent HEMS.

THE HEMS IS THE KEY TO THE ENERGY TRANSITION IN THE HOME

A HEMS coordinates the interplay of electricity consumers and generators in a household. With the help of a HEMS, selfgenerated energy can be distributed sensibly in the household and consumption can be flexibly managed. Generators - such as the PV system - and consumers - such as the EV, the EV charger or the heat pump - are coordinated by the intelligent software in a way that reduces electricity costs and increases independence from the energy supplier. This makes the HEMS the key to the energy transition in the home.

For participants in the energy market, a HEMS offers the opportunity to expand their own business while adding value. A HEMS offers the opportunity to generate new sales and secure competitive advantages - without having to increase the technical complexity for the energy market participant. For example, a HEMS can be used to directly identify which energy devices or electricity tariffs would provide a useful extension to a particular home setup. The energy market participant can then offer these additions directly to the end customer.

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Thanks to Kiwigrid, with VoyagerX we can offer our customers a manufacturer-independent HEMS that covers a broad spectrum of sector coupling. Users enjoy an intuitive portal in which they can optimize consumers and save the climate and their wallets.

Fabrice Neumann, Product Owner Energy Management Systems BayWa r.e. Solar Energy Systems GmbH

A HEMS IS WORTHWHILE FOR END CUSTOMERS, GRID OPERATORS AND OEMS

One thing is clear: a HEMS brings numerous advantages. The most important use cases for a HEMS are the following:

1. Create more transparency through PV self-consumption and detailed monitoring

With the sector-specific hardware and a corresponding energy management system, various energy devices (e.g. a PV system, a storage unit, an EV charger, a heat pump) can be integrated.

2. Reduce costs through intelligently managed PV self-consumption optimization

With the help of a cross-sector HEMS platform, the various energy devices can be monitored and analyzed. The intelligent linking of the devices makes it possible, for example, to charge the EV or operate the heat pump precisely when the sun is shining. This enables the HEMS to optimize PV self-consumption. In the future, it will also be possible to use the flexibility of the EV battery to supply the house with electricity (vehicle-to-home, V2H).

3. Reduce costs through time-of-use tariff optimization

One use case that will play an increasingly important role in the energy system of the future is the ability to respond to grid and market incentives through a HEMS. For example, it could be configured to optimize the charging of the EV and the operation of the heat pump in response to incentives from the grid (e.g., charging when electricity supply is increased) and from incentives from the market (e.g., charging when electricity prices are particularly favorable). The HEMS can then be used to calculate, conclude and manage an intelligent, time-variable electricity tariff (time-of-use tariff).

4. Generate revenue by selling electricity

In the future, a HEMS will also generate additional revenue by selling surplus energy to the community or wholesale markets. In terms of the vehicle-to-grid (V2G) principle, the flexibilities of the EV battery and the PV storage can also be sold to the power grid and compensate for fluctuations in the grid.

Different target groups can benefit from a HEMS in different ways. These are the added values for end customers, network operators, service providers and OEMs:

ADDED VALUE FOR END CUSTOMERS

To illustrate the added value of a HEMS for end customers, it is worth taking a look at the typical needs of homeowners. Put simply, three categories of needs can be observed here:

Contribution to environmental protection

Sustainability is becoming increasingly important to more and more people. That's why there are more and more homeowners who want to actively support the development of renewable energies when making personal purchases.

A HEMS offers them the opportunity to save not only electricity costs but also several thousand kilograms of CO2.

Independence

The need for independence from the central energy supply has become more important, especially in the wake of the energy crisis. A HEMS offers the possibility of self-sufficiency and therefore creates more freedom and increased comfort.

Financial gain

The promotion of renewable energies in the home also offers an economic opportunity. A HEMS can also be worthwhile for homeowners who are primarily concerned with economic efficiency and return on investment.

The total value pool enabled by combined decentralized energy systems and a home energy management system (HEMS) amounts to up to 1,400 euros per user per year (calculation based on public prices and internal market analyses from 2021).



ADDED VALUE FOR GRID OPERATORS AND THE ENERGY SYSTEM

Through smart grid integration of private PV systems, energy storage systems, EVs, heat pumps and air conditioners, a HEMS also brings benefits to grid operators and our energy system. It enables forecasting and real-time monitoring of small scale generation and loads post-metering and in the last mile of the distribution grid. This allows generation to be targeted and loads to be shifted to avoid grid congestion. In addition, flexibilities on the demand side can be used to relieve the grid when electricity demand is high.

ADDED VALUE FOR SERVICE PROVIDERS AND OEMS

Service providers and OEMs can expand their business model by integrating a HEMS and offer end customers an integrated experience across all domains. The complexity of the Energy-IoT software required for this can be left to an expert like Kiwigrid.

The core competence of an OEM (e.g. heat pump manufacturer, PV system manufacturer, car manufacturer) is the production of hardware systems. Revenue is generated from the sale of hardware, which is why an OEM usually specializes in a particular hardware domain.



THE COLLABERATIVE OEM



Solarwatt is the pioneer in the field of solar-driven sector coupling. For 30 years, we have been enabling private individuals, as well as companies, to efficiently supply themselves with solar power, sustainable heat and electromobility. The core element of sector coupling is the intelligent energy manager SOLARWATT Manager flex, which we developed together with Kiwigrid ten years ago - at a time when smart control and optimization of energy flows was not yet on anyone's mind but our own. Since then, we have continued to adapt the energy management system in a trusting collaboration and expand it with new technical solutions so that our customers can use their self-generated solar power as efficiently as possible.

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Peter Bachmann, Vice President Strategy & Customer Solutions Solarwatt GmbH The core competence of an Energy-as-a-Service provider lies in the provision of highly digitized end-customer services. Revenue is generated on the basis of a service offering.

The charts show the areas in which service providers and OEMs create value with their own resources or on the basis of their own technology (yellow) and the areas in which additional value can be created by integrating a HEMS (dark blue). One thing is clear: A HEMS opens up a broad spectrum of new value creation potential.

THE INDEPENDENT HOME THE MARKET-LEADING, MANUFACTURER-INDEPENDENT HEMS

The Independent Home (TIH) white label products connect, visualize and optimize PV systems, EV chargers, heat pumps and electricity storage. All products are based on the KiwiOS platform, which provides a strong technical backbone. TIH includes an easy-to-install gateway, access to the scalable and secure KiwiOS cloud, as well as web-based and mobile apps for end customers and installation partners. The Independent Home is the market-leading, manufacturer-independent energy management system to optimize energy flows and costs across sectors and value streams. The various products enable all the described advantages of a HEMS to be fully exploited - benefiting all market participants.

CROSS-SECTOR. COST-SAVING. USER-FRIENDLY.



THE INDEPENDENT HOME

ABOUT KIWIGRID

The future of energy is decarbonized and decentralized. And we offer the most powerful platform and the most efficient products to make it happen.

As an IoT company for decentralized energy and e-mobility, we are paving the way for an economy powered entirely by renewable energy. We are driving sector coupling and helping people maximize their energy efficiency.

White label products are developed and operated on our KiwiOS platform for leading international hyperscalers, system distributors and OEMs. As a result, our customers tap into the globally growing decentralized energy market, diversify their offerings, and differentiate themselves from the competition.

KIWIGRID IN FIGURES

+20,000

Connected users

3,000 Registered installers

+140 Enthusiastic Kiwis

>240,000

Connected things

7 billion

Data points per day

11 Countries in operation

*Figures from spring 2023