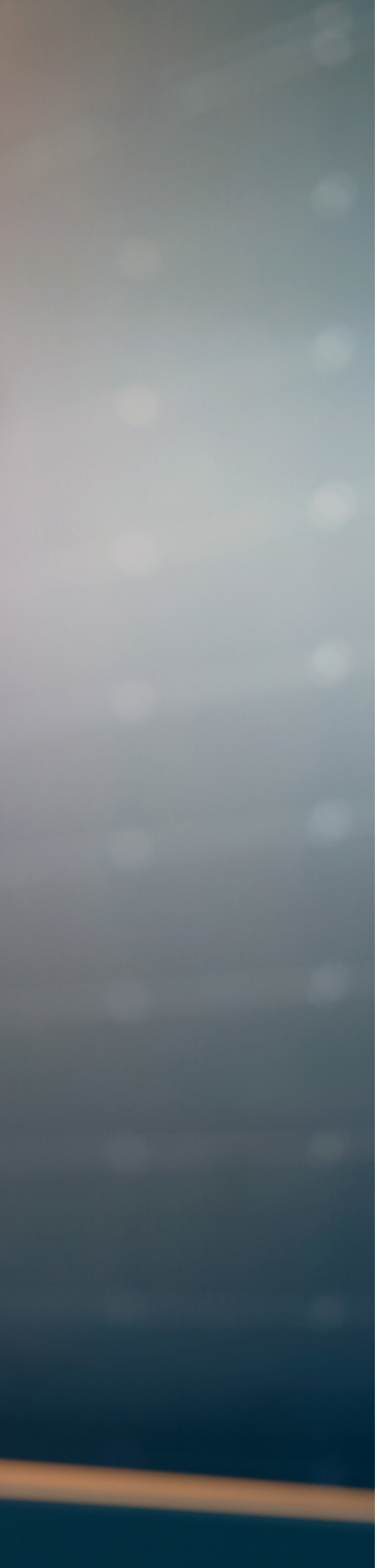


Integrating energy sectors for a sustainable future

In the quest for green energy solutions, sector coupling has emerged as a pivotal strategy for integrating renewable energy across various areas of the economy. As a pioneer of solar technologies for more than 30 years, Solarwatt has evolved from a Greentech startup to one of the leading providers of photovoltaic systems and energy solutions in Europe. As we strive for a more resilient and sustainable energy future, we examine sector coupling as a concept and the company's approach through technological innovations and strategic initiatives, and investigate the broader impact on the energy transition.

Sector coupling refers to the integration of different energy sectors, including electricity, heating, and transportation, into a cohesive system powered by renewable energy sources. This approach replaces fossil fuels and maximises the efficiency and utility of renewable energy, ensuring that energy produced in one sector can be used across others. For instance, excess electricity from solar panels can be used to heat water, charge electric vehicles (EVs), or power industrial processes, thereby reducing waste and enhancing overall energy efficiency.

Which sectors play a part?

Just as there are multiple terms for sector coupling, the sectors themselves are also referred to by various names. The energy sectors electricity, heat, gas, and mobility are contrasted with the consumption sectors encompassing households, trade, industry, and transport. Most discussions of sector coupling typically reference a combination of electricity, heat, transport, or mobility, sometimes adding industry as a significant consumer or user of specific solutions.

Additionally, a classification system based on economic energy consumers is often used, encompassing categories such as the energy sector, industrial processes, manufacturing industry, agriculture, and waste and wastewater management. Solarwatt observes growth in all electric sectors in each of the markets it covers. This is driven by the development of newly installed

PV systems, storage solutions, for both home and commercial segments, heat pumps, and EV charging infrastructure.

What is the aim of sector coupling?

Sector coupling is expected to play a crucial role in achieving ambitious climate protection goals. This is accomplished by increasing the use of renewable electricity to replace fossil fuels in the transport, heating, and commercial sectors. Additionally, the adoption of efficient technologies will lower the overall energy demand. The primary objective is to reduce greenhouse gas emissions, which result from burning coal, natural gas, and oil, thereby mitigating climate change. Moreover, sector coupling should support the phase out of nuclear energy.

A vision and a strategy

Solarwatt's commitment to sector coupling is firmly rooted in its vision of a decentralised, sustainable energy future. With more than 30 years of experience, it recognises that the transition to renewable energy requires more than just the installation of solar panels; it understands the advantages that an integrated approach to integrating various energy systems brings.

The focus of Solarwatt's strategy centres on three key strategic pillars: technological innovation, integrated energy solutions, and strategic partnerships. The company has subsidiaries in 10 European countries and a network of over 8,500 specialist partner installers throughout Europe who are vital in helping us achieve our vision with sector coupling expertise from planning to installation.

With a savings potential through sector coupling and photovoltaics in Germany alone estimated at 160.000.000 t CO_2 the impact of intelligently linking complete energy solutions, and minimising climate change, is compelling. But how do we achieve this?

Technological innovation

At the heart of its sector coupling vision is technological innovation. It continues to drive forward technical innovation in renewable solutions and to develop a range of products designed to facilitate the seamless integration of renewable energy across different sectors.

Photovoltaic systems

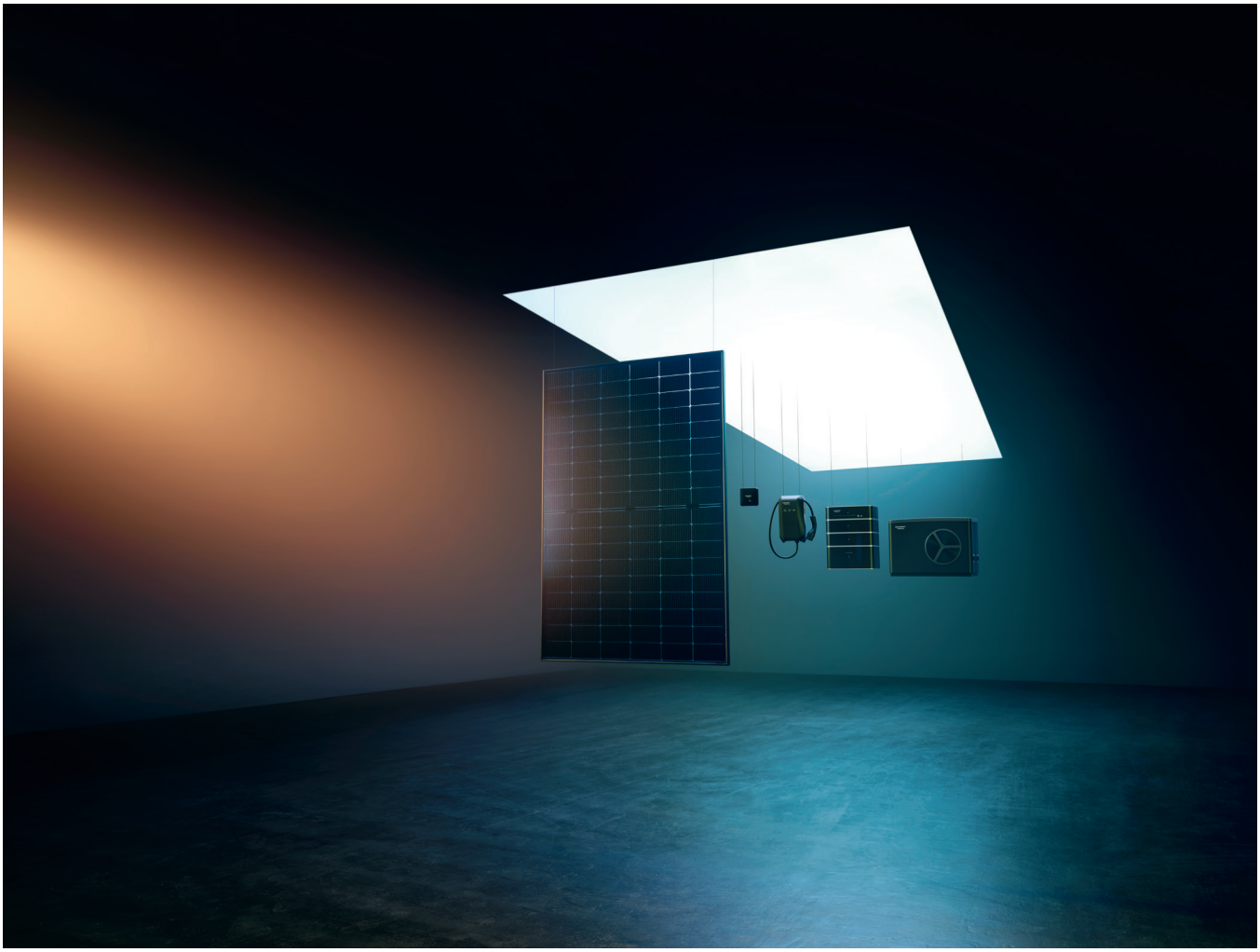
Solarwatt's high efficiency, high performance photovoltaic panels are the foundation of its energy solutions. These panels convert sunlight into electricity, providing a renewable source of power for homes, businesses, and communities.

As a pioneer of glass-glass technology, it drives solar technology innovation with its R&D and PV testing laboratory in Dresden, Germany. The key drivers for its product management team are quality, durability, and performance, ensuring a portfolio of panels that sustainably deliver superior performance, guaranteed.

These panels come with a 30 year warranty, maintaining 90% residual power at the end of this period. Furthermore, even in challenging market conditions, it ensures that its new panel generation incorporates the latest TOPCon cell technology, is produced to the highest standards of fair labour in zero carbon factories, and is integrated into an efficient circular economy.

Energy storage solutions

To address the intermittent nature of solar energy, the company has been developing advanced energy storage systems since 2015. These batteries store excess solar energy generated during peak production times, making it available for use when production is low, or demand is high.



As the world continues to transition towards renewable energy, sector coupling will play a crucial role in shaping a cleaner, greener, and more sustainable energy landscape.

This capability is crucial for balancing supply and demand in a sector coupled system. In 2021 its technological cooperation with BMW in home storage brought the development of a flexible, modular battery storage system that is built to the highest quality and safety standards. Today, the business continues to develop new innovations in such technologies to create storage solutions that maximise function, performance, and efficiency.

Smart energy management

The company's energy management systems (EMS) play a critical role in optimising energy use across different sectors. These systems monitor and control energy flows, ensuring that energy is used where it is most needed and that surplus energy is efficiently stored or redirected.

The EMS integrates with various devices, such as heat pumps, EV chargers, and smart appliances, to create a responsive and adaptable energy ecosystem. But how does it help revolutionise renewable energy powered homes? Consume the electricity you generate yourself and you will not need to sell it to the grid for a low feed in tariff. Meanwhile, the feed in tariff, the money generated from feeding surplus electricity back into the grid, is substantially lower.

You can use the energy you generate even more efficiently by selecting which appliances should consume it. Or you can use your solar energy to provide home electricity, to heat water, for heating, or to charge your electric car. Solarwatt Manager lets you choose between different energy management strategies: automatic, solar optimised, and time optimised.

Once you have chosen your preferred strategy, the smart energy management system takes care of everything for you. This smart monitoring and control centre can be connected to all devices and appliances and can easily switch them on and off at scheduled times. Customers can also manage their entire integrated home energy solution through the Solarwatt Manager Portal or via the Solarwatt Home mobile app. This ensures all technologies work seamlessly together, are sourced from a single provider, are designed for optimal operation, and are all visible and manageable in one convenient app.

Integrated energy solutions

This approach to sector coupling involves creating integrated energy solutions that combine solar power, energy storage, and smart management systems. These solutions are designed to meet the diverse energy needs of residential, commercial, and industrial customers.

Residential solutions

For homeowners, it offers a comprehensive energy solution that includes solar panels, battery storage, and an EMS. This setup allows homeowners to generate their electricity, store excess energy, and manage their consumption efficiently. By integrating heating systems, such as heat pumps, and EV charging stations, households can achieve greater energy independence and reduce their carbon footprint.

C&I solutions

Businesses can benefit from this sector coupling strategy by optimising their energy use and reducing operating costs. Tailored solutions are provided that integrate solar power, energy storage, and smart management systems with commercial heating and cooling systems. This integration helps businesses reduce their reliance on grid electricity, manage peak demand, and lower their overall energy expenses.

For industrial applications, robust energy solutions can support large scale operations. These solutions integrate renewable energy with industrial processes, such as manufacturing and logistics, to enhance efficiency and sustainability. By coupling electricity, heating, and mobility sectors, industries can reduce their carbon emissions and improve their energy resilience.

Strategic partnerships

Recognising the importance of collaboration in advancing sector coupling, the company has formed strategic partnerships with various stakeholders, including technology providers, energy companies, and research institutions. These partnerships enable it to leverage complementary expertise and resources, driving innovation and expanding the reach of its solutions.

Technology partnerships

Collaborating with leading technology companies allows Solarwatt to integrate cutting edge innovations into its products and solutions. These partnerships focus on developing advanced energy storage technologies, smart grid solutions, and smart devices that enhance the functionality and efficiency of its systems.

Since 2021 it has been in a technological cooperation with BMW for home storage solutions. BMW Group supplies Solarwatt with high quality battery components that are used in the group's EVs. Photovoltaics and electromobility are growing together. EVs can be charged ecologically and economically with solar power from the home via an intelligent energy management system.

The company also partners with leading heat pump manufacturer Stiebel Eltron which combines its pioneering spirit and visionary ideas as one of the world market's leading suppliers of home technology in the heating sector. Combining Solarwatt's solar panel technology, battery storage solutions, and EMS with Stiebel Eltron's heat pump systems the two companies will create a single renewable energy package.

Installer partnership network

With a growing network of over 8,500 highly skilled installer partners across Europe, its collaboration with renewable energy experts is an essential component of a sector coupled energy future. Its premium partnership programme began in 2014 as it recognised the challenge of balancing the growing demand of the market and a shortage of skilled labour in the sector.

Quality solutions demand first class service and expertise, so a specialist training academy was established to provide a range of exclusive partnership tools and resources. Support platforms like the Pro Portal, along with digital tools for acquisition, planning, and sales, and apps for visualising customers' future investments, enhance the offering. Eye catching advertising and the provision of premium products from a single source further benefit installers and their customers. The vision is simple: partnerships make us stronger.

Research and development

Solarwatt actively engages in research and development initiatives both in house in Dresden, Germany and with academic institutions and research organisations like the TUV SUD and Fraunhofer Institute and EUPD Research. These collaborations focus on advancing the science of renewable energy, exploring new materials and technologies, and developing innovative solutions for energy storage, management, and distribution.

The UK in context

The UK has set ambitious targets to achieve net zero greenhouse gas emissions by 2050. Sector coupling is seen as a crucial strategy to meet these goals. The country's energy landscape is rapidly evolving, with significant investments in renewable energy, smart grids, and energy storage solutions.

The UK has made substantial progress in expanding its renewable energy capacity, particularly in wind and solar power, but still has a long way to go compared to its European neighbours. Solarwatt subsidiaries operate throughout Europe with growing markets in the Netherlands, France, Italy & Spain in 2015 followed by the UK and Ireland in 2021.

The broader impact on the energy transition

The company's commitment to sector coupling has significant implications for the broader energy transition. By promoting the integration of renewable energy across various sectors, it is helping to create a more resilient, efficient, and sustainable energy system. This approach aligns with global efforts to reduce greenhouse gas emissions, combat climate change, and achieve energy security.

Reducing carbon emissions

Sector coupling enables a more efficient use of renewable energy, reducing the need for fossil fuels and lowering carbon emissions. By integrating renewable energy into the heating, cooling, and transportation sectors, these solutions contribute to significant reductions in greenhouse gas emissions.

Enhancing energy efficiency

The integration of different energy sectors allows for more efficient use of energy resources. Smart EMS ensure that energy is used where it is most needed, minimising waste and optimising consumption. This efficiency translates into cost savings for consumers and businesses.

Improving energy resilience

Decentralised energy systems, supported by sector coupling, enhance the resilience of the energy grid. By generating and storing energy locally, Solarwatt's solutions reduce the reliance on centralised power plants and mitigate the impact of grid disruptions. This resilience is particularly important in the face of increasing climate related events and energy demands.

Supporting sustainable mobility

Clean mobility will drive us all towards a better future. An electric car does not just reduce emissions; it also saves money. If you use your photovoltaic system to charge your e-car a full 'tank' can cost you as little as nothing! The integration of EV charging stations with energy solutions promotes the adoption of electric vehicles. By using energy generated by a photovoltaic system to power EVs, Solarwatt contributes to the decarbonisation of the transportation sector, which is a major source of greenhouse gas emissions.

Does sector coupling make sense?

Even today, electricity from renewable sources is cheaper to generate than conventionally produced electricity. This makes sector coupling a key component of the energy transition, as it enables the electrification of all sectors, allows increasing independence from fossil fuels, and therefore makes both economic and ecological sense. However, this applies first and foremost when renewable energies are used.

Sector coupling is also possible with fossil based energy sources. However, it is then less efficient and contributes little to climate protection. Solarwatt's position on sector coupling underscores its commitment to a sustainable energy future. Through technological innovation, integrated energy solutions, and strategic partnerships, it is advancing the integration of renewable energy across the electricity, heating, cooling, and mobility sectors.

This holistic approach not only enhances energy efficiency and resilience but also supports global efforts to reduce carbon emissions and combat climate change. As the world continues to transition towards renewable energy, sector coupling will play a crucial role in shaping a cleaner, greener, and more sustainable energy landscape.

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