

Energy Transition and Sustainability

We strive to develop and improve solutions that are innovative, sustainable and of the highest quality. Solutions that contribute to successful projects in Marine & Industry.

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Introduction

For both the energy transition and better energy quality, the need for sustainability is great. In this white paper we provide tips and insights into handling the complexity of energy management efficiently, smartly, safely and simply. After reading this white paper, you will have the minimum you need to know about the tightening energy standards, smarter energy use and the benefits of digital solutions for both new and existing buildings and installations.

In order to make the right choices, it is important that your current situation is properly mapped out and that your economic and sustainability goals are clear.

International and European climate goals

International climate goals are important and include the Paris Agreement, the UN's Sustainable Development Goals (SDGs) and Nationally Determined Contributions (NDCs).

Countries translate these goals into national policies in different ways, with some countries setting themselves more ambitious goals than the international targets, while others fall short of the goals set.

An example of a country that has set more ambitious targets is Sweden, which aims for net zero greenhouse gas emissions by 2045, five years ahead of the Paris Agreement target.

An example of a country falling short of the set goals is the United States, which left the Paris Agreement in 2020 and has not yet set new climate goals.

The European Climate Law has goals of reducing EU greenhouse gas emissions by at least 55% by 2030 and achieving climate neutrality by 2050.

Several European countries, such as Germany, France, Sweden, Denmark and the Netherlands, have set their own national targets to achieve these European climate goals.

To achieve these goals, these countries are taking various measures such as reducing greenhouse gas emissions and investing in renewable energy sources and CO₂ storage technologies.

Is energy management and reporting required?

In many countries and regions, energy management and reporting is mandatory for companies above a certain size or that consume a certain amount of energy. This can vary depending on local laws and regulations.

In the European Union, for example, companies with more than 250 employees or an annual turnover of more than €50 million are required to conduct energy audits and prepare energy efficiency plans. In addition, large companies are also required to report their CO₂ emissions through the European Emissions Trading Scheme (ETS).

Also in the Netherlands, energy management and reporting are mandatory for companies covered by the European Energy Efficiency Directive (EED). In the Netherlands, the EED has been transposed into the Environmental Management Act. Companies covered by this legislation must conduct an energy audit every four years, mapping their energy consumption and proposing energy-saving measures.

In addition, companies that consume more than 50,000 kWh of electricity or 25,000 m³ of gas per year are subject to an energy conservation information obligation. This means that they must inform the government of what energy-saving measures they have taken and what measures they still plan to take.

Also, companies participating in the European Emissions Trading Scheme (EU ETS) in the Netherlands must report on their CO₂ emissions. In short, energy management and reporting are thus mandatory for companies in the Netherlands that fall under the EED and/or the energy savings information obligation.

Solutions that contribute to sustainability

There is a range of solutions available to companies looking to become more sustainable and reduce their greenhouse gas emissions. Some examples are:

1. **Renewable energy:** The use of renewable energy sources such as solar, wind, hydro and biomass can help reduce greenhouse gas emissions and reduce dependence on fossil fuels.
2. **Energy efficiency:** Using energy more efficiently and reducing energy waste can reduce greenhouse gas emissions. This can be done, for example, through energy-saving measures in buildings and improving the energy efficiency of vehicles and industrial processes.
3. **Electrification:** Switching to electric vehicles and electric heating can reduce greenhouse gas emissions, especially if the electricity comes from renewable energy sources.
4. **Circular economy:** Focusing more on recycling and reusing materials can reduce greenhouse gas emissions and reduce pressure on natural resources.
5. **Changing consumption patterns:** By consuming more consciously and choosing more sustainable products and services, greenhouse gas emissions can be reduced.
6. **Afforestation and reforestation:** Planting trees and restoring forests can help remove and store carbon from the atmosphere and reduce greenhouse gas emissions.

These are just a few examples of solutions that can increase sustainability. There are many more measures that can help reduce greenhouse gas emissions and make the economy and society more sustainable.

In this white paper, we will focus on the components that affect your electrical infrastructure. In particular, this concerns Energy Efficiency and Electrification and what choices you have in this regard.

What is Energy Transition and is it realistic?

The energy transition is - in its essence - the transition from an energy system based on fossil energy sources to an energy system based on renewable and carbon-neutral energy sources. In other words, the transition from the use of coal, oil and gas to the use of sun, wind and water as sources of energy. The current energy system uses about 95% fossil energy.

This energy transition simultaneously raises the issue of the availability and affordability of energy and the reliability of the energy system. Currently there are insufficient sustainable energy sources to realize this transition, as the supply of energy from these sources fluctuates throughout the day and across the seasons.

Impact of Energy Transition

It is extremely difficult to precisely identify the social costs of all forms of energy. They involve long chains, from extraction, production, construction to operation and possible clean-up of the resulting pollution. There are also costs incurred by integration into the energy system, such as storage, transmission and distribution.

With an energy management solution, the impact for a company is often still limited to some local adjustments in the plant. With an energy transition, usually a much larger part of the electrical infrastructure requires upgrading.

This is because existing electrical infrastructures were designed with the idea that only one energy source (a fixed electricity grid or Grid) would be available. Today, multiple energy sources, multiple energy flows and also energy flows in multiple directions are often required simultaneously.

Such a complex electrical infrastructure is not possible without adding intelligence so as to safely channel all the energy. In this case, we speak of a "Smart Grid." Various energy management solutions are now available on the market for this purpose.

Designing such a Smart Grid involves a lot of work in practice. Just take the mix of energy sources that supply partly direct and partly alternating current while the energy supply is continually fluctuating, and it must also be capable of both returning energy back to the grid and storing it. Such a design requires experts with solid knowledge and experience to mitigate risks and ensure availability.

To achieve the climate goals, far-reaching electrification seems the most obvious solution at the moment. But with the current infrastructure, practically speaking, we then immediately run into the biggest challenge: the lack of consistent grid and transport capacity, also known as grid congestion.

Congestion management:

To better distribute the transmission capacity for consumption and feed-in on the electricity grid, congestion management has been developed. This enables energy suppliers to coordinate the supply and demand of electricity with consumers and producers, for a fee. This creates more room for sustainability and allows the suppliers to connect more customers to the grid.

Even if there is room on the grid, grid operators can often take a long time to expand their capacity. As a result, these processes can take a very long time. So how can we still expand our production, while maintaining heating or supplying newly purchased charging stations with electricity?

Making more efficient use of existing energy resources

Part of the solution is to use existing energy resources as efficiently as possible by actively directing and managing all the energy flows. We call this energy management. In addition, increasing renewable energy sources and even local energy storage can reduce dependence on external gas and electricity sources.



How can energy management contribute to the sustainability of your business? Energy management can help reduce an organization's impact on the environment. Reducing energy consumption can lead to a reduction in greenhouse gases and other harmful emissions, contributing to a more sustainable world.

But what is Energy Management?

Energy management is the process of planning, monitoring, and managing an organization's total energy consumption (including gas, water, heat, etc.) to reduce costs, improve efficiency, and reduce its environmental impact.

Energy management provides solutions to some of today's challenges. For example, when sustainably generated energy cannot be delivered back to the grid or when companies want to expand but face full power grids.

However, do not expect energy management to be a panacea; it can smooth out energy peaks (lower contract costs), improve energy quality and optimize energy use but at most you will gain about 10-15% additional power. However, the achievable result will also vary according to the situation. If you need significant additional electrical power to accommodate an expansion, it is a good basis for reducing a footprint and costs, but only part of the solution.



Energy management and the NEN-EN-ISO 50001 standard

A standard for an Energy Management System (EMS) has been established at the global level. This standard has been translated into Dutch and published as NEN-EN-ISO 50001:2018 (nl). The standard lays out the requirements that an energy management system must meet. The standard supports all types of organizations in implementing systems and processes for improving energy efficiency.

If the government requires you to implement energy management and asks you to report on your energy management and improvement actions with respect to energy consumption, the report must meet the requirements of this standard. But even if the government has not yet imposed an obligation on you, it makes sense to begin presenting reports in this format right away.

Important!

Regardless of which energy management product you choose, it is important that the report meets the requirements of the standard! So that no conversions have to be made afterwards or, even worse, not all the data requested are available.

What are the benefits of energy management for you?

There are many benefits of energy management, both for you and your organization and ultimately for society as a whole. Some key benefits for you include:

1. Cost savings

Energy management can help reduce energy costs by optimizing energy use and identifying inefficient processes. By reducing energy use, organizations can significantly reduce their energy bills.

2. Increased operational efficiency

By using energy more efficiently and gaining a better understanding of energy usage, energy management can help organizations to improve operational efficiency and reduce production costs.

3. Reduced environmental footprint

By using energy more efficiently and switching to renewable energy sources, energy management can help reduce the carbon footprint and fight climate change.

4. Regulation

More and more governments are introducing regulations and laws that require companies to reduce their energy consumption and emissions. Energy management can help companies comply with these regulations and avoid fines or other penalties.

5. Risk management

Energy management allows organizations to manage risks related to energy prices, energy supply and other factors that affect their energy use.

6. Improving reputation

Reducing environmental impact and demonstrating commitment to sustainability can help an organization improve its reputation and strengthen its image with investors, customers, partners and other stakeholders.

The role of Alewijnse in the Energy Transition, Energy Management and Infusion

Alewijnse helps you optimize energy efficiency (power quality) and ensure the continuity and safety of installations. We guide you through the energy transition, help you get more out of your installations, and advise on adjustments from storage to the expansion of your energy network.

This minimizes problems within electrical installations, reduces risk, improves efficiency and ensures safety.

Summary:

Expansion is a modification or optimization where a company expands within the existing infrastructure and does not take more energy from the grid than the amount of energy already available: This is achieved by optimizing the use of the available energy.

Energy storage: an important component of sustainable energy supply:

Energy storage and distribution technologies are used to balance the supply and demand of electricity or heat in both small and large-scale grids. Not all renewable energy sources have a continuous production character. In fact, some are distinctly variable.



The ability to store electrical energy enables the full use of production capacity independent of demand. In the event of temporarily high energy demand, there will be no need to generate additional energy if it can be drawn from a stored reserve. During off-peak hours, the energy storage system can then be replenished.

Energy storage is relevant to you when:

- You can use or distribute the energy yourself at a later time.
- You generate your own energy, but you cannot feed any excess energy back into the grid, for example because the grid operator cannot connect you to the grid or the grid is already too full and cannot transport the generated energy.
- You are considering an increase in your electrical connection but there are high costs involved.

Don't go storing energy for which you and those around you have no use!

There is a wide variety of storage solutions available, the most obvious of course being a battery system where you store the energy directly as electricity for later use.

However, you can also convert the energy directly to another form of energy such as heat (using a boiler) or hydrogen. However, each conversion results in losses, and some conversion techniques involve significant losses. Storing electrical energy in batteries and taking it out again is not free of losses either.

However, there are other ways of using the surplus energy directly, for example, by building charging stations to charge EVs (cars, buses and trucks) nearby, possibly in combination with battery storage. You also may be able to supply nearby businesses with energy but be aware that distribution (i.e. supply not for your own use) is regulated by the government.

Which storage and/or distribution options are of interest to you will have to be determined on a case-by-case basis.

For the installation of a storage system, in addition to the purchase cost there are additional costs associated with the design and construction of a safe electrical infrastructure, a safe storage location and possible permits required to realize it.

Such a complex electrical infrastructure with grid connection, generation, feed-in, storage etc. can no longer safely be manageable for the user and therefore requires added intelligence to safely manage all the energy. Energy management therefore plays another important role here.

Schneider Electric EcoXpert™ -partner program

Since the beginning of 2022, Alewijnse and Schneider Electric have worked together to address pioneering Energy Management issues for their joint customers. The emphasis here is on insight and analysis.

Schneider Electric is a leading supplier of electrical and power components and can also provide the necessary intelligent metering instruments as needed. Together with Schneider Electric, we can find a suitable approach and solution for almost every situation.

What is Schneider PME?

Schneider has several solutions to measure energy flows and improve energy quality. Schneider Electric calls the umbrella product: EcoStruxure Power Monitoring Expert (PME).

This PME product is a scalable and configurable software Energy Management product which can also be used with various hardware from other suppliers such as Siemens or ABB. It is also possible to use PME to retrieve and process already collected information from other databases.

Purpose of the EcoXpert™ Partner Program

The EcoXpert partner program is unique in its industry. It offers a valuable partnership between Schneider Electric and a global, multidisciplinary ecosystem of solution providers. Together, we deliver best-in-class automation and digital solutions for efficiency and sustainability to our customers. EcoXpert partners are the implementation arms of EcoStruxure™ around the world.



Implementation: working together towards the goal

“To measure is to know.”

We begin by asking about your goals. What goals do you want to achieve and by when? Is there a need to achieve certain goals first? If it is not clear to you what goals you can achieve then it makes sense to map the existing situation first.

If the existing situation is not clear beforehand, we start by mapping out the existing energy flows (electricity, water, gas, oil, etc.). To do this, the best measurement locations are determined on site, from the process and electrical diagrams. Depending on the question and the desired result, and in consultation with you, some measuring positions may need to be added to get a good overall picture.

Our experts place and/or connect, together with the person responsible within your company, the energy meters and collect the data from these measuring points for later analysis. The collected data remains your property throughout the process and afterwards and will not be shared with third parties. We only use the data for the energy analysis.

If few or no measurement values are yet available within your company, we first perform an initial measurement to determine what the current situation is. We also do this to provide insight into the performance results thereafter.

In modern production environments, many measurements are already taken and the data are stored in different locations. The data is then present somewhere in the systems, but the challenge is to make the data available and turn it into useful information. To do this, the context, meaning and coherence of the data must be made clear.



We also do not forget the environment. Some circumstances can indirectly have a lot of influence on the measurements: for example, what was the weather, humidity or temperature at that moment of measurement, were there any special circumstances, what was in the production planning, etc.

Once sufficient data is available and made usable, analysis follows to determine where improvements can be made. You will receive full insight into the measured data and the analysis. The analysis is specific to your situation and not applicable to other companies, production lines or locations.

What's in it for you?

After useful information has been created from the measurement results, we analyze the results and summarize them in a concise report. After the analysis, we will share the results and conclusions with you. In doing so, we will indicate which adjustments we expect will be the most interesting solutions for your situation. These may include, for example, adjustments to optimize energy efficiency, to generate energy or to store and distribute energy.

We provide you with insights into the scope and consequences of the proposed adjustments to your installation. We will also give you insights into the costs of the possible adjustments and calculate what the payback period or savings could be, based on the measures known at that time.

Determining the payback period or savings often depends on government policy for the next few years. Currently, government policy on sustainable choices for the next 4-5 years is neither predictable nor consistent.



Example Schneider Electric PME

Influence of government and media on payback time

The media play an important role in forming opinions about sustainability, environmental impacts and feasibility. Most people are inundated through various media channels with information such as the many research results, unsubstantiated opinions, selective truths and even falsehoods or disinformation.

Politicians often express their “own” opinions based on their political beliefs and/or sentiment; after all, they want to win over voters outside of politics.

We all want to become more sustainable, but without financial incentives from the government it often does not get off the ground. The desire to become more sustainable is often partly based on the prospect of financial gain.

Governments may offer financial incentives to encourage sustainability. But if these measures become too popular and/or cost a government too much, the same government can adjust or even stop these measures.

The size of the prospective benefit often depends in part on the size of an incentive package. Changing the rules of the game by the government during the payback period can have major financial consequences. It may result in a particular solution suddenly becoming interesting or even completely uninteresting as a result.



Summary

One thing is certain: the “best” solution for an Energy Transition does not exist, or not yet. For the built environment, utilities and industry, every effort must be made in the coming years to produce energy more sustainably and to become less dependent on fossil fuels.

At the same time, more and more technical solutions, new sustainably generated energy sources and energy storage systems are becoming available. The influence of government/politics, subsidies and the media on future developments is considerable and unfortunately not predictable. As a result, some good ideas will have little chance of success and others will boom.

Without clear and predictable government policy, it is impossible to say for sure what the best and affordable sustainable strategy will be. What we do know for certain is that energy management reduces costs and carbon footprint and increases efficiency. In the process, you also meet legal requirements right away and manage risks better.

Alewijnse is constantly researching the opportunities and feasibility of different and new technical solutions to best advise you. To gather knowledge, we visit trade fairs and lectures on these topics and work with various research institutes and suppliers. In addition, we engage with our customers to hear from you what your experiences are and what you think are the best solutions for now and in the future, and especially why. We learn from this every day.

We invite you to enter into an exploratory discussion with us without obligation. Together we can explore what is relevant for your situation and what a possible investment will bring you both financially and reputationally.



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Our goal is to co-create value with and for our customers and partners. We aim to develop and improve electrification and automation solutions which are innovative, sustainable and of the highest quality. We focus on making a valuable contribution to successful projects in the maritime and industrial sectors.

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