



# ENERGY.21

## INTRODUCTION

**Europe is working hard to cut its greenhouse gas emissions substantially while encouraging other nations and regions to do likewise. One of the key targets of the EU for 2030 is to cut 40% in greenhouse gas emissions compared with 1990. Although committing to such a concrete target is a promising start, it seems much more is needed to achieve the Paris Agreement.**

In The Netherlands we committed to an even more ambitious goal, 49% in 2030. This implies an additional reduction of 56Mton CO<sub>2</sub> emissions in The Netherlands and with 22 Mton coming from the industrial sector<sup>1</sup>. This number might even increase when the international targets of the Paris Agreement are reviewed in 2019. The Netherlands has already plead for further reduction of emissions of 55% for Europe and, if this target does not seem feasible, will seek close cooperation with neighbor countries to further pursue the ambitious climate agreement of Paris.

At Energy21 we work on an industrial solution that is overlooked by many and turns out to be a crucial step in reducing greenhouse gas emissions. We believe that there's an enormous potential to contribute to the climate agreement by digitalizing the energy processes of larger industrial sites while creating a healthy business case as well.

## INDUSTRIAL ENERGY

The Industrial sector is by far the largest energy consumer in the Netherlands, being responsible for 1/3 of the total amount of energy consumption. Approximately half of their energy consumption is derived from raw materials such as petroleum and natural gas. These materials are foremost used as chemical building blocks and not for their energy content. In our fight against climate change, our focus has predominantly been on reducing this share together with plans for replacement by green hydrogen (hydrogen economy) and biological materials (bio-based economy). Although these developments are a must for a sustainable future, they are also longer-term solutions. None of these technologies have reached the stage that they can replace fossil resources for the industrial sector today.

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<sup>1</sup> (Dutch) According to PBL, Planbureau voor de Leefomgeving / [regeerakkoord 'Vertrouwen in de toekomst'](#)

The other half of energy consumption is conventional; starting up and maintaining the operational business processes. Driven by relatively high energy prices in the Netherlands, Dutch industry has in recent decades realized

**“None of these technologies have reached the stage that they can replace fossil resources for the industrial sector today.”**

considerable improvements in their search for energy efficiency resulting in a worldwide leadership position. It does not mean however that there are no further gains to be made. As long as

industrial sites are recognized by giant white plumes hanging over the area, it is certain that significant amounts of unused heat are being released. Steam is in many industrial processes the number one energy carrier and one of the most substantial daily challenges that industry sites face is the fine tuning of steam production that is required for their processes.

Unlike electricity and gas, where the grid operator is responsible for balancing production and consumption, in the case of steam industry parties are responsible for this balance themselves. As the primary production process of industries should not be endangered, more steam will always be produced than consumed. However, for excess steam there's simply no alternative than to emit to the environment.

These emissions in themselves are not the biggest issue; it's the energy used to create this excess steam. Ultimately there are greenhouse gases released in the production of excess steam, but the steam has not added any value in the process chain. Reduction of excess steam therefore leads to a direct reduction

of greenhouse gas emissions. We believe that, due to the size of industry in the Netherlands, this can have a considerable impact.

## SIZE OF THE PROBLEM

Industrial locations with a high demand for heat and a high complexity will suffer most from excess steam. The challenge is to accurately estimate the required heat, precisely plan the steam production and take possible waste flows into account. The most important sectors that could benefit from this are the (petro)chemical and paper industry; the combined heat production based on fossil fuel sources accounts to approximately 275 PJ per year<sup>2</sup>, resulting in CO<sub>2</sub> emission of app. 15 Mton. This exactly matches the reduction target of CO<sub>2</sub> emissions for industrial sector in our fight against climate change. One percent reduction in the production of heat therefore directly contributes to one percent of the CO<sub>2</sub> emission target.



2 (Dutch) <https://vnpi.nl/wp-content/uploads/2017/06/rapport-warmteonderzoek-mee-definitief.pdf>

3 (Dutch) <https://www.klimaataakkoord.nl/klimaataakkoord/sectortafels>

## SYSTEM OPTIMISATION

By connecting the measurement systems at industrial sites with energy market data, you have a good overview of the energy processes. The biggest advantage is the possibility to optimise the system instead of optimising each separate part of the value chain. System optimisation helps industrial parties to reduce their CO<sub>2</sub> emissions by fully aligning the steam production with the heat demand. Combining these energy data flows creates more optimisation possibilities, such as the more efficient use of generating assets, exploiting opportunities on the energy market and optimal planning of maintenance. The strength of system optimization, is that the reduction of CO<sub>2</sub> emissions goes perfectly hand in hand with a healthy business case.

Industry traditionally focused on the improvement of energy efficiency by means of the latest asset technology. The problem that arises here is that this, in general, requires high investments. In addition, the steps made in digitalisation have a clear focus on assets while digital system solutions for the optimisation of energy processes are barely applied, especially not on an operational level. Since 2015, our solution has been fully operational at one of the largest industrial sites in Europe where the described benefits are realized and demonstrates the operational feasibility and scalability to other industrial locations.

## IMPACT

In the short term our solution realized a reduction of the natural gas consumption and lowers CO<sub>2</sub> emissions. In the longer term, we see a crucial role for the industrial sector in energy transition. Increasing flexibility in energy consumption is required to keep up with the increasing supply of renewable energy on the grid. We believe that increasing volatility of electricity prices due to more renewable generated energy will lead to an accelerated electrification of the industry. Raw materials like oil and gas will be replaced in the chemical process by biomass, power to heat, or power to gas. The energy processes will therefore be increasingly complex so to successfully adapt to the future energy market it is crucial to gain insights in operation and in the energy market.

**“The energy processes will become increasingly complex in the future, so to successfully adapt, it is crucial to gain insights in both the operation of the industrial site and in the energy market.”**

## ABOUT ENERGY21

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Energy21 was founded 21 years ago and has since established itself as a long term partner for renowned energy companies. By combining our expertise of the energy ecosystem and our digitalisation capabilities, we transform relevant data into actionable insights based on the clients' processes and in their regulatory framework.

These insights enable clients to achieve their sustainability goals, improve cost effectiveness and capture market opportunities while guaranteeing security of supply. Our digital tools include the latest developments in database technology with an in-house developed calculation engine to handle exceptionally large data streams (such as complete industry site measurements).

[www.energy21.com](http://www.energy21.com)

## We can help you to improve your utility planning

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Contact Thomas Crabtree via [thomas.crabtree@energy21.com](mailto:thomas.crabtree@energy21.com) or +31 6 3085 2747 to discuss your planning challenges. Read more about how we can deliver, manage and optimise your energy processes using our software solution EBASE or take a deeper dive into other energy optimisation strategies for industrial energy users on our website.