



# energy efficiency



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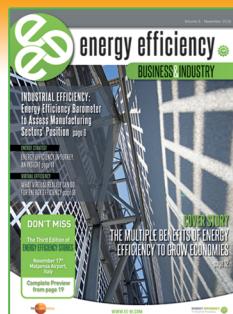
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foreword

# Food for Energy Efficiency



Sara Ibrahim, Editor EEBI

We are slowly going towards the end of the year and it's time to take stock of the **current energy scenario**, while anticipating trends and defining expectations for next year. Energy efficiency is still a big thing today and the industry is gradually responding to the inputs launched by the **European Union** and the appeal of environmental institutions, whose mission is to bring attention to the need for a greener world, which means more sustainable and efficient processes, less wastes and the employment of **new clean sources**, when it comes to the industrial world.



For this reason, the current issue mainly focuses on these aspects and shows up some of the measures deployed – systems, projects and regulations – to increase the efficiency of **production plants** and encourage the **energy transition**. One of the most effective tools presented in the following pages is the energy efficiency **Barometer for industry**, recently launched to meet industrial demands for measurement and verification actions as well as energy management in general. The **Energy Performance Contract** is another interesting tool introduced in Europe to boost energy efficiency investments and savings, thanks to the revised Guidance lately published by Eurostat, where the accounting rules are illustrated.

The standardization of energy efficiency projects is now managed by the **Investor Confidence Project** that delivers a common framework for developing energy efficiency projects to reduce uncertainty for clients and investors. This results in an increased number of projects to help grow the energy efficiency **finance market**.

Looking at next appointments and dates to save, we want to remind you the upcoming **Abu Dhabi International Petroleum Exhibition & Conference (ADIPEC)**. In the frame of this show, Huawei will hold its Annual Global Energy Summit on the theme "Leading New ICT for Higher Safety and Efficiency in the Oil and Gas Industry".

The richest countries in the Middle East are paving the way for a **sustainable growth**, so food for energy efficiency is coming from every corner of the globe. We are eager to nourish it more and more.

Sara Ibrahim  
Editor EEBI

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## WEG Brings Efficiency to High-power Applications



To enable users achieve further energy efficiency in a wide range high-power applications, WEG has expanded its CFW500 series of variable speed drives (VSDs). The new E frame size for the rated power range 18.5 kW - 22 kW is a great fit for applications such as mechanical engineering systems for conveying, turning, hoisting, pumping and ventilation. "In light of EN 50598, the new standard looking at Ecodesign for power driven systems and their applications, an integrated approach to electrical drive technology is becoming more widespread and VSDs are particularly sought after across broader sections of the industrial market," says Johannes Schwenger, Head of Product Management Low and Medium voltage Drive Systems Europe at WEG.

## Alexander-Peter Schmidt is Voss Fluid New Division Manager

Starting immediately Alexander-Peter Schmidt is assuming management of the "Ready-to-Install hydraulic line systems" division. His goal is to expand the system business of the fluid supplier. In the future customers should be supplied more comprehensively and efficiently the tailor-made hydraulic lines and hoses, as well as ready to install assemblies or prefabricated assembly kits. In this newly created position, Alexander-Peter Schmidt is immediately responsible for the optimization and expansion of the system business of VOSS Fluid.



"There are only very few suppliers globally that offer a similar broad product range for hydraulics. Our customers get everything from one source" said Alexander-Peter Schmidt, manager of ready-to-install hydraulic line systems at VOSS Fluid.

## Eastman TRĒVA Received USDA Certified Biobased Product Label

Eastman Chemical Company, the world's leading producer of cellulosic materials showcased Eastman TRĒVA at Bio-Based Live. TRĒVA, a breakthrough in engineering bioplastics designed to help companies overcome the trade-off between sustainability and performance, recently received its USDA Certified Biobased Product Label from the United States Department of Agriculture's BioPreferred® program. This certification verified that TRĒVA GC6011 has a biobase content of 45 percent and TRĒVA GC6021 has a bio base content of 42 percent. TRĒVA offers a combination of thermoplastic properties and performance, design flexibility — and price — that other bioplastics cannot match. The cellulose in TRĒVA is sourced exclusively from reputable suppliers holding internationally recognized certifications.



## The Italian TGE and meteocontrol Continue to Expand Their Business Relationship

The Italian company TGE S.r.l. is now using the VCOM monitoring portal by meteocontrol GmbH to control its 102 photovoltaic systems. The O&M provider also plans to integrate other existing systems into the latest portal solution and to equip new systems with meteocontrol hardware and software for its customers. TGE currently manages 102 photovoltaic systems with an installed output of about 17,000 kWp under an O&M agreement. To create the most efficient monitoring system possible, the technical operational manager decided to combine all of the solar systems in the VCOM monitoring portal. "Thanks to our long working relationship with meteocontrol, our choice was obvious: We would switch from the previous system to the latest portal solution offered by meteocontrol," said Davide Forastiere, the Technical Director of TGE.





# GREAT SUCCESS FOR MAINTENANCE SUMMIT

**More than 300 selected professionals attended the first edition of SIMa – The Italian Summit for Maintenance, the 11 and 12 of October**

The first edition of SIMa, the Italian Summit for Maintenance, that took place at Malpensa Airport, closed its doors last week with great results.

TIMGlobal Media and Head of Marketing of A.I.MAN.. Besides the usual update and sharing of current experiences from the sector, participants could benefit from two exclusive guided visits to the BHS, Baggage Handling System, and SEA Energia Trigeneration Plant of Malpensa. At the end of the day, attendees received a Certificate of Attendance, a conference bag and a special Maintenance Kit with numerous gadgets and useful tools for Maintenance operators, offered by the sponsors.

## 11 October - MaintenanceStories



Divided in two separated days, the Summit hosted the 11th of October the fifteen's edition of MaintenanceStories, focused as usual on the account of application stories about Industrial Maintenance. The conference, presented by A.I.MAN. and organized

by TIMGlobal Media and Manutenzione T&M, in collaboration with SEA and with Festo Academy as Associate Partner, saw the participation of about 150 selected attendees among Maintenance and Plant Managers. Marco Marangoni, Associate Publisher at TIMGlobal Media and A.I.MAN. Communication and Members Coordinator, opened the conference with Cristian Son, Group Publisher at

MaintenanceForum. Presented by A.I.MAN. in collaboration with Manutenzione T&M and SEA, this event is a real novelty in the Italian Maintenance panorama, where Associations and Organizations working in the sector held



their annual conventions, organized in parallel sessions.

The Osservatorio sulle Attività di Manutenzione degli Aeroporti, the TeSeM – Osservatorio Tecnologie e Servizi per la Manutenzione, and Man.Tra – Associazione Manutenzione Trasporti, attracted about 170 selected operators, among members and maintenance experts. At the end of the day, a selected group of participants had the possibility to take part in the exclusive visit to Malpensa Air Traffic Control Tower.

## The Sponsors

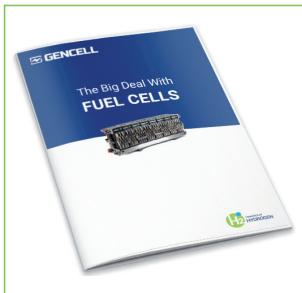
The success of the first edition of SIMa was sealed thanks to numerous sponsors, that believed in the potentiality of this project first. Main Sponsors of the event were: Agomir, A-Safe, EJ, Gruppo IN, HYDAC, Ise, Mecoil, NTN-SNR, Parker Hannifin, Pruftechnik, Schaeffler, SKF, Verzolla. The other Sponsors: ATP - Articoli Trasmissione Potenza, Bianchi Industrial, Carl Software, Conrad, Gemmo, Geosec, Giakova, GIPStech, Grena, Hauraton, Industrial Forniture Moro, Infor, Karberg & Hennemann, Kobold, MPM, NSK, Omnicore, Renox, Repcom, Righini, RS Components, SDT Italia, Servicemax, SEW-Eurodrive, Siccom, Siemens, Sika, Sirtel, Siveco, Smeri, Stahlwille, Steute, Texpack, Timken, Tosoni Fluidodinamica. ■





## The Big Deal with Fuel Cells

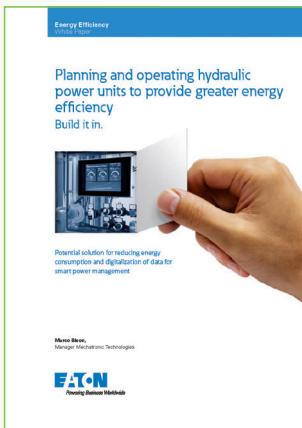
**GenCell.** The white paper discusses hydrogen-based fuel cell technologies and why fuel cell power solutions can be an excellent source of backup energy. Aging electrical grids in many parts of the world make a steady supply of electricity imperative for our always-connected lifestyles and businesses. In 2015, grid failures cost an estimated USD 110 billion to the US economy. For companies in the utility, telecom, homeland security, healthcare and niche industrial markets, the high business costs of electrical failure necessitate backup power solutions that are reliable and easy to operate. Fuel cells are a hot topic and the publication of this white paper is designed to educate the market about fuel cells in general and to highlight the benefits of alkaline solutions for backup energy. The cost breakthroughs will enable GenCell to deliver affordable alkaline fuel cell power solutions.



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## Planning and Operating Hydraulic Power Units to Provide Energy Efficiency

**Eaton.** Reducing energy consumption is a stated objective of the European Union. In 2007, EU Member States agreed to cut primary energy consumption by 20 per cent by 2020. Increasing energy efficiency is an important aspect in supporting this effort. This measure not only reduces energy costs, but also helps achieve a higher level of supply security and protects the climate. Every consumer sector offers considerable potential for energy savings across Europe. Industry plays a key role in this. For instance, in Germany almost 30 per cent of total final energy consumption is accounted for by the manufacturing sector. The initiatives launched by the EU in this area also include the Ecodesign Directive 2009/125/EC.

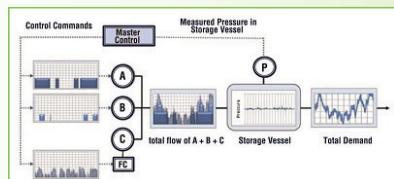


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## The Use of Master Controls

### Kaeser Compressors.

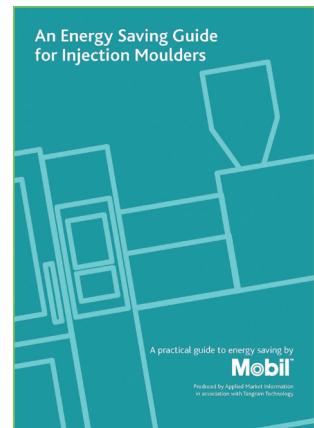
When it comes to plant air systems, the fundamental needs of facilities are usually quite similar. The biggest requirements are to meet specific pressure, flow, and air quality targets to ensure that the quality of the end-products remain predictably high at all times. Beyond this, air system reliability is also critical so as to avoid costly process line maintenance or unscheduled shutdowns. Last but certainly not least, optimizing energy consumption is important at a time when cheap energy is a thing of the past. In most industrial plant applications, multiple compressors rather than a single unit are supplying the total air flow. Lower efficiencies can occur when compressors that are part of multi-unit air system operate on their individual control settings, rather than operating in concert to deliver maximum performance and efficiency.



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## An Energy Saving Guide for Injection Moulders

**ExxonMobil.** Plastics injection moulding is an energy intensive process. And, because energy carries both an environmental and financial cost, it makes sound sense not to waste it. Energy spending in a typical plastics injection moulding plant often approaches the cost of direct labour. But, while labour ranks high among management concerns, little effort is expended on controlling energy spending. The potential savings are considerable, however. For an injection moulding plant that has implemented no effective energy reduction measures, experience shows some 30% of total energy use is discretionary. This is avoidable energy spending that can be clawed back through practical management, maintenance and investment actions.



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# BLOCKCHAIN & ENERGY DISCUSSION

By Marius Buchmann, PostDoc at Jacobs University, Bremen, Germany

The introduction of blockchains could trigger the energy sector. However, today it is still a niche topic in energy business. This article offers an analysis of the potential institutional implications of this technology



Marius Buchmann,  
PostDoc at Jacobs University

This article is about one of the hottest topics in energy business, the blockchain. While there are many discussions already going on about the technological dimension and business cases based on the new technology, we will focus on the institutional side again. Importantly, we intend to sketch a first general picture of the potential institutional implications of the blockchain technology in the energy sector, thereby keeping in mind that the full potential, applicability and success of this new technology is still uncertain.

On 14th February 2017 energy and blockchain experts met in Vienna on the Event Horizon 2017 to discuss the potential of the blockchain technology for

the energy sector. The general idea behind such events like the one in Vienna seems to be very compelling: Can we apply a decentralized ledger technology like the blockchain to a system that currently develops towards an increasingly decentralized structure (due to the diffusion of renewable electricity supply and new applications on the demand side, like electric vehicles), like the electricity system? Today, blockchain is a niche topic in energy business, with less than 2% of all startups that focus on blockchain technology targeting specifically the energy sector. However, the incumbent energy business becomes aware that blockchain is an important topic with huge potential.

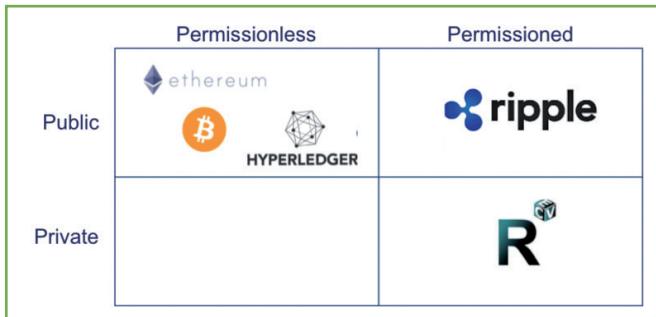
Now, if we take a look at the debate on the Event Horizon, we see very passionate people from different startups and a lot of enthusiasm. This is because the blockchain is based on a very good selling idea: At low costs, it uses a transparent distributed system that is based on democratic processes and replaces less transparent intermediate services. These three components (cost saving, transparency and democratic deci-

sion making) are very compelling and are, at least from our point of view, the main reason why blockchain gains some much audience at the moment. Still, blockchain is in its infancy, with many obstacles to overcome. Especially on the technical side, the blockchain technology has yet to prove that it can meet the (very high) expectations. Yli-Huumo et al. (2016) give a nice overview of the current challenges for the blockchain technology:

- **Throughput:** Bitcoin network is currently maximized to 7tps (transactions per second). VISA (2,000 up to 48,000 tps) and Twitter (5,000tps)
- **Latency:** To create sufficient security for a Bitcoin transaction block, it takes currently roughly 10 minutes to complete one transaction.
- **Size and bandwidth:** size of a BitCoin Blockchain is over 50,000MB (February 2016). When the throughput increases to the levels of VISA, Blockchain could grow 214PB each year.
- **Security:** The current Blockchain has a possibility of a 51% attack. In a 51%



Some examples for permissioned and permissionless / public and private blockchains



#### THE DIFFERENCE BETWEEN PRIVATE AND PUBLIC BLOCKCHAINS

	PUBLIC	PRIVATE
Access	Open read/write	Permissioned read and/or write
speed	Slower	Faster
Security	Proof-of-Work/Proof-of-stake	Pre-approved participants
Identity	Anonymous/pseudonymous	Know identities
asset	Native assets	Any asset

attack a single entity would have full control of the majority of the network's mining hash-rate and would be able to manipulate Blockchain.

**Wasted resources:** Mining Bitcoin wastes huge amounts of energy (\$15million/day).

**Usability:** The Bitcoin API for developing services is difficult to use. There is a need to develop a more developer-friendly API for Blockchain.

**Versioning, hard forks, multiple chains:** A small chain that consists of a small number of nodes has a higher possibility of a 51% attack. Another issue emerges when chains are split for administrative or versioning purposes.

From our perspective, especially the energy intensity is very interesting. Croman et al. (2016) calculated for BitCoin that the energy costs related to each transaction add up to 6.2\$, given the current design of BitCoin (1 MB per block, latency of 10 minutes). For the future, Croman et al. (2016) project that these costs could be cut by 80% with larger block size (4 MB) and higher latency (12 seconds).

So at this point, we can conclude that the blockchain is a promising technology, but far from being ready for the mass market.

#### The Blockchain: A brief introduction

In a nutshell, the blockchain is a distributed, digital peer-to-peer register, which stores every transaction between two connected agents in a ledger. This ledger is distributed globally on all connected nodes. This distributed data set consists of a collection of historic data about all transactions made. Each transaction is added to the dataset as a new block (in a linear and chronological order), which results in a full record of all transactions made between two parties. As each connected node carries the same data set, algorithms can be used on each computer to verify transactions.

Currently, many different blockchains pop up. Basically, we can differentiate these chains using two criteria:

- Supervision and control: Is there an institution that controls the blockchain (e.g. decides who joins a blockchain, can delete or alter the data set in the ledger)?

- Visibility: Either a blockchain is public and thereby visible for everyone or private and therefore only visible to the members of the blockchain.

Today, most blockchains are public permissionless ledgers, i.e. there is no central

supervision of the ledger and the responsibility to manage the system is with its users. With permissionless blockchains, everyone can connect to the blockchain and use it for transactions.

The public blockchain uses a public and distributed ledger to verify transactions. If there needs to be an adaptation of the public blockchain, this requires in most cases consensus (or at least majority) decisions by all users. On the other hand, one institution or a group of institutions supervises a private and commissioned blockchain. Access to the private blockchain is restricted, verification is based on the private blockchain and the hosting institution is responsible for the management of the blockchain ledger. Figure 2 gives a first overview of prominent examples for permission and permissionless public and private blockchains. Obviously, a permissionless private blockchain is a theoretical construct. So far, this approach has not been used in the real world.

The blockchain might change or even disrupt many sectors as it challenges the business case of intermediaries. Merz (2016) refers to "disintermediation". So far, many business models are based on the fact that two parties that want to execute a transaction do not have enough information about each other to process the transaction.

In different markets, disintermediation has been an issue for retailers due to new digital platform providers, e.g. Amazon, Uber and AirBnB (Merz 2016). Now, the blockchain technology offers the potential to substitute service of intermediates in more than just the retail business.

#### Takeaway

The introduction of blockchains could trigger some institutional changes in the electricity sector. These institutional changes could affect both, the retail and the network sector. We could move towards a world where generators directly sell electricity to the customers, which results in a stronger integration of generation and retail business. ■



# ENERGY PERFORMANCE CONTRACTS

By Rod Janssen, President of Energy Efficiency in Industrial Processes (EEIP)

**Recently Eurostat, the statistical office of the European Union, published new guidance on recording of energy performance contracts in government accounts. This could have a big impact on investments in energy efficiency in the public sector**



**Rod Janssen,**  
President of EEIP

According to the Energy Efficiency Directive 2012/27/EU (EED), Energy Performance Contracting “means a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings.”

Slowly but surely, energy performance contracts have gained in importance as policymakers and investors look for

ways to ensure a better flow of financing. For the European Union this started with the SAVE directive in 1993, where Article 4 stated: “Member States shall draw up and implement programmes to permit third-party financing for energy efficiency investments in the public sector. For the purposes of this Directive, ‘third-party financing’ means the overall provision of auditing, installation, operation, maintenance and financing services for an energy efficiency investment, with recovery of the cost of these services being contingent, either wholly or in part, on the level of energy savings.” This was replaced more than a decade later but the point is that it got member states actively assessing the role that third-party financing and energy performance contracting could play in the public sector.

## New guidance from Eurostat

While there was guidance published a few years ago, it is good to see that Eurostat published new guidance in September. The revised guidance note clarifies the accounting rules applied to the treatment of energy performance contracts. It follows up on the work already undertaken by Eurostat to clarify the accounting rules for various types of public investment, including the Guide to the Statistical Treatment of Public Private Partnerships published last year.

Energy performance contracts in the public sector offer a practical solution to make public buildings and other public infrastructures more energy efficient, as the initial investment can be covered by a private partner and repaid by guaranteed energy savings. However, frequently this type of contract simultaneously contains elements of a rental, service, lease, purchase or loan agreement, making its recording complex. At the request of Member States, Eurostat has worked with National Statistical Institutes (NSIs) to reflect on the most appropriate recording of EPCs in government accounts.

The Eurostat guidance note on the accounting treatment of EPCs significantly increases the possibilities for public bodies to use such contracts, by including and clarifying the circumstance in which these contracts can be recorded off government balance sheets. It also paves the way for the development of a stronger market of EPC providers, involving many SMEs. According to data collected by European PPP Expertise Centre (EPEC), over the last five years 345 new public-private partnership projects concerning energy performance were signed in 16 EU Member States, for the total value of over €65 billion. EPCs where the energy efficiency is obtained through energy management measures, without any investment in equipment addition or renewal, are



treated as simple service or maintenance contracts. This revised guidance is applied in cases where the EPC-contractor can be considered as the economic owner of the asset, where EPCs require an initial capital expenditure to improve the energy efficiency of a facility.

### What does this mean for the new phase of the Investor Confidence Project for Industry, District Energy and Street lighting?

The Investor Confidence Project Europe, funded by the European Commission, is designed to unlock access to financing for the building, industry, district energy and street lighting markets by standardising how energy efficiency projects are developed, documented and measured. Standardisation using best practices set out by ICP reduces the risk for investors in regard to the projected outcome of an energy efficiency project. It also reduces time and skills needed by investors to perform due diligence for each individual project. Finally, it reduces transaction costs. These factors open the door for

more capital to finance such projects or re-finance investments of project developers and ESCOs.

Street lighting, to a large extent, and district energy, to a lesser extent, involve public bodies. The new guidance for EPCs can be an important way for integrating it with the IPC approach, since EPCs can certainly be used for IPC projects.

The European Commission has already funded a project looking at street lighting and EPCs. This is important for increasing the awareness of how EPCs can help in the investment decisions for lighting upgrades.

### Short summary of ICP

ICP (Investor Confidence Project Europe) delivers a standardised framework for developing energy efficiency projects to reduce uncertainty for clients and investors – to help grow the number of projects and the energy efficiency finance market.

ICP is based on two foundations:

#### 1. The ICP framework

The ICP framework assembles best practices and existing technical

standards into a set of Protocols that define a clear roadmap for developing projects, determining savings estimates, and documenting and verifying results.

#### 2. Independent 3rd party certification

ICP's Investor Ready Energy Efficiency™ (IREE™) is an international certification that insures best practices, the right professionals and third-party validation are used to deliver high-quality projects that you can bank on.

### Where are we now?

The current ICP project for industry, district energy and street lighting started in May 2017. The first phase concerns industry but the next phase on district energy and street lighting will start early 2018. The industry phase includes development of the protocols taking advantage of the expertise of a large group of experts and then testing the system through pilot projects.

Soon, ICP will be setting up separate technical forums for district energy and for street lighting to help in the development of protocols. If you would like to be included, please visit our website. Also, importantly we would like your reaction to the guidance from Eurostat on EPCs and whether you see this as a major breakthrough to help increase investments for district energy and street lighting. ■



# THE ENERGY EFFICIENCY BAROMETER OF INDUSTRY

By Stefan M. Büttner, Head of International Affairs & Strategy, EEP / Institute for Energy Efficiency in Production

An effective tool to enhance industrial energy productivity and help companies consider how they can accelerate the energy transition



**Stefan M. Büttner,**  
Head of International Affairs & Strategy at EEP

The majority of industrial companies who recently participated in the Barometer, are already pursuing a systematic approach to increase energy efficiency. Furthermore most of them want to invest in energy efficiency in the future. But where do individual enterprises stand in terms of energy efficiency and what can they do to further strengthen their competitiveness? The Industry Barometer originated in Germany and is collected semi-annually by the Institute for Energy Efficiency in Production (EEP) of the University of Stuttgart, in collaboration with inter alia Fraunhofer IPA, Energy Efficiency in Industrial Processes (EEIP), the Expense Reduction Analysts (ERA) and numerous partners across 88 countries.

## The Barometer across 88 Countries

From now until 31 December 2017, manufacturing companies across 88 countries once again have the opportunity to participate in and help grow the Barometer. Business participation is vital to developing the Barometer and enabling companies to consider how they can accelerate the energy transition through greater efficiency and productivity in their own business. In addition to this, through direct comparison with the average competitor in your sector (anonymized), you can make investment decisions and derive strategies for your own business' energy efficiency and productivity. Access to this information can help increase your company's efficiency and thus improve your competitiveness.

## The advantages of the Barometer

Launched at the Industrial Energy Efficiency meeting of EU / UNEP FI's Energy Efficiency Financial Institutions Group (EEFIG) by EEP, EEIP and Fraunhofer in Brussels on 19 October, the #EEBarometer helps to accelerate action towards increased energy efficiency action in industry, it takes the pulse of the industrial demand side and:

- Helps to reduce unknowns, risks and uncertainty in relation to energy efficiency interventions.
- Informs legislators what the current situation is and what the needs of industry really are, how instruments

perform and what type of instrument or framework may be required.

- Assesses the effectiveness/impact of pilot- and development programs and puts them in relation to control-groups.
- Makes financial institutions and service providers aware of feasible projects and required funding mechanisms and services.
- Informs companies about where they stand & about new strategies.
- Equips companies and legislators with insights on how and where to act to increase energy productivity.
- Enables, in medium-term, sector-specific cross-country analyses – TOP-Runners.

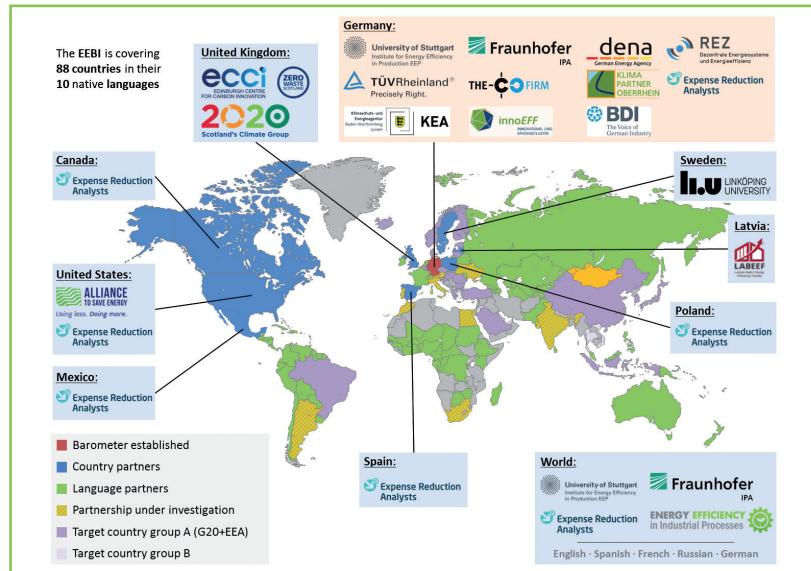
In the current survey period, a special focus is being put on measurement and verification (M&V), as well as energy management in general. With the negotiations regarding potentially binding energy targets for 2030 underway, we also want to ask participants what they want their governments to do in relation to energy efficiency. Findings will inform the 'industry efficiency action group's position on how to best move forward with industrial energy efficiency in Europe and across the globe.

The online questionnaire can be found at: <http://www.eep.uni-stuttgart.de/eeeii/>. The survey takes just a few minutes to complete and your data will be anonymous. Participate and spread the word!

## Breakdown of Results

In addition to selected results, registered users (free of charge) will be offered an exclusive, sector-specific breakdown of the results. Country and language partners also benefit from sector-specific results (contact author if interested in becoming a partner). The survey closes on 31 December 2017. Results will be published online in the end of February 2018.

Allowing more and more entrepreneurs to give their views in their mother tongue, further languages and country versions addressing also national issues will be added gradually. In 2017-II, companies across 88 countries will be able to participate in their native languages:



The results of the previous data collection can be downloaded here: Energy Efficiency Barometer Summer 2017.

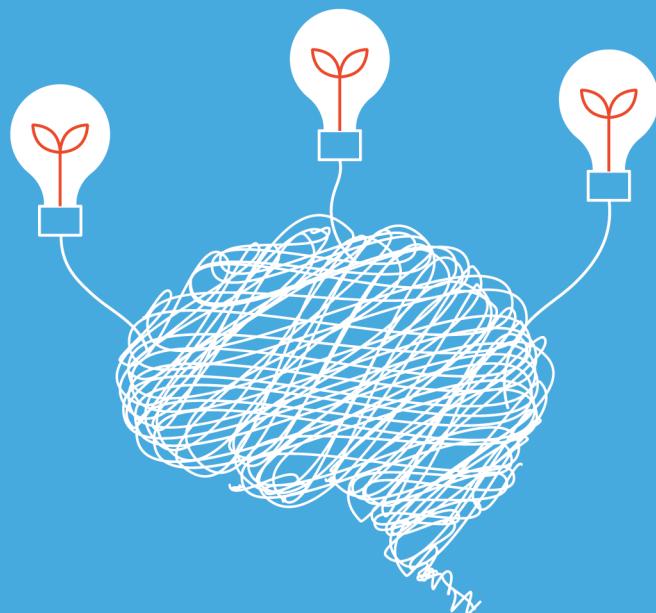
Future data collections will take place from April-June and October-December of each year. ■

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# INVESTOR CONFIDENCE PROJECT

By Juergen Ritzek, Co-founder and Business Director of EEIP

## Top 2 benefits explained for energy efficiency project developers that decide to apply the ICP framework



**Juergen Ritzek,**  
Co-founder and Business Director of EEIP

ICP (Investor Confidence Project Europe) delivers a standardised framework for developing energy efficiency projects to reduce uncertainty for clients and investors – to help grow the number of projects and the energy efficiency finance market.

A framework already exists for buildings and new schemes are now being developed for projects in industry, district energy and street lighting.

The first new framework will be on industry (launch December 2017). And we are already looking for project developers to apply this framework in pilot projects. As a project developer, you will ask the question "what's in it for me" and here you will find the answers.

### Top 2 benefits why project developers should apply the ICP framework

#### 1: Get more clients

A key barrier for industrial clients to start a new energy efficiency project lies in the uncertainty about the outcome, the difference between the "promises" and the "real savings" generated. This is where the ICP framework comes into play. It is a technology neutral and certifiable process description ensuring that best practices are applied throughout the development of the project. The framework has been developed together with the financial community to help lenders and investors have greater confidence in project outcomes, which basically means an ICP project is more likely to deliver against its promises. Increased confidence obviously works both ways, it benefits your clients as they can trust that they get what is promised.

For a project developer, applying the ICP framework becomes a sales argument: "We will deliver against our promise. You can trust us as we are applying the ICP framework which has been developed by the industry and recognized by financial institutions."

#### 2: Free marketing support

The ICP project in Europe is co-financed by the European Commission (again, think about trust!) and EEIP, the largest global industry network for energy efficiency is a partner. Part of EEIP's contribution is to promote those project

developers applying the ICP framework. As well as the entire energy intensive industry in Europe, EEIP covers the industrial value chain from end to end, which means EEIP is reaching out to all your current and potential clients. EEIP will tell them that you are a professional project developer using highest standards to deliver against your promises. And EEIP will also recommend any potential client to "request" project developers to apply the ICP standards.

### The reason to believe

The underlying objective of the Investor Confidence Project Europe is to help unlock access to financing for the building, industry, district energy and street lighting markets by standardising how energy efficiency projects are developed, documented and measured. Standardisation using best practices set out by ICP reduces the risk for investors in regard to the projected outcome of an energy efficiency project. It also reduces time and skills needed by investors to perform due diligence for each individual project. Finally, it reduces transaction costs. These factors open the door for more capital to finance such projects or re-finance investments of project developers and ESCOs.

A side benefit of such a standard is logically that it increases also the certainty for clients of energy efficiency projects that projected energy savings will be delivered.

## The origin

The logic behind the ICP approach links back to the outcome of an initiative called Energy Efficiency Financial Institutions Group (EEFIG), established in 2013 by the European Commission Directorate-General for Energy (DG Energy) and United Nations Environment Program Finance Initiative (UNEP FI). EEFIG created an open dialogue and work platform for public and private financial institutions, industry representatives and sector experts to identify the barriers to the long-term financing for energy efficiency and proposed policy and market solutions to them. EEFIG has engaged 120 active participants from 100 organizations to deliver clear and unambiguous messages. EEFIG recommended adopting the ICP in Europe and it was introduced in 2015 with the support of Horizon 2020 funding.

## The ICP structure

ICP uses an approach originally developed in the US for the buildings sector. In Europe, it was first adopted for buildings through a project financed by the EC. Now ICP is tackling industry, district energy and street lighting. ICP is based on two foundations:

### *1: The ICP framework*

The ICP framework assembles best practices and existing technical standards into a set of Protocols that define a clear roadmap for developing projects, determining savings estimates, and documenting and verifying results.

### *2: Independent 3rd party certification*

ICP's Investor Ready Energy Efficiency™ (IREE™) is an international certification that insures best practices, the right professionals and third-party validation are used to

deliver high-quality projects that you can bank on.

## What's happening right now – and how project developers can engage

Right now, ICP Protocols are being developed for industry and they should be available by the end of the 2017. The protocols for district energy and street lighting will be available early 2018. How the development of protocols is organised – and how you can participate Engaging in the development of protocols (the ICP framework) is easy and allows project developers to shape the final product across Europe.

The ICP technical team together with internationally recognised experts are developing a draft which will then be shared with the Technical Forum which acts as the leading technical advisory group to input, discuss and feedback. This process is organised in an iterative way. The Technical Forum is open to all interested experts and the whole process is open source.

## Summary and call to action

Applying the ICP framework for energy efficiency projects gives you a competitive advantage in the market, more business, better re-financing opportunities and – as part of the ICP EU co-funded project – free marketing support in all European countries and free technical assistance to adopt the ICP system. ■

**Investor Confidence Project (ICP)**  
for energy efficient industry, district energy and street lighting.

**BENEFITS**

for **Project Developers**:

- Get more clients
- Free marketing support

for **Clients**:

- Certainty: Get your projected energy savings

@ICPEurope #ICPEurope INVESTOR CONFIDENCE PROJECT



# WIND POWERED INDUSTRIAL PROCESSES

By Bruno De Wachter, based on an Application Note by Aedan Kerdan

This quick assessment investigates the flexibility potential, based on a Leonardo Energy Application Note, that lays behind the practice of adapting energy consumption to supply variations, maximizing self-consumption of on-site wind power demands industrial processes

European governments are reducing the feed-in tariffs they are prepared to pay for wind energy. Since the cost for wind turbine construction and installation has been going down, on-site wind energy can still be beneficial, but it might require a totally different business case. Once feed-in tariffs drop under the cost of wholesale grid power, the most rational option for managing on-site wind power becomes to maximize self-consumption. In this way, charges for grid services as well as the costs and taxes associated with the purchase of electricity can be avoided. To be able to ex-

ploit this opportunity, the industrial processes that are integrated with the wind turbine(s) need to have the necessary flexibility in their energy demand to be able to follow the variable wind energy production pattern. The reward is a relatively predictable electricity cost over the life time of the wind turbine, since a large share of the wind energy cost is situated before the turbine becomes operational. This stands in contrast with the increasing unpredictability of wholesale electricity market prices. Fluctuations in supply caused by the growing penetration of renewables into Eu-

rope's electricity networks will further increase this energy cost volatility. The tools to manage wind-integrated industrial processes already exist. Demand Side Management has become increasingly familiar to companies with energy-intensive processes. The DSM software tools that enable companies to manage their power demand in response to market price signals can also be used to manage demand in response to weather signals. However, the first question for any company considering a move to wind-integrated industrial processes is, whether their industrial processes

AN EXAMPLE OF THE FLEXIBILITY CHECKLIST USED TO COMPARE THE FLEXIBILITY POTENTIAL OF FIVE DIFFERENT INDUSTRIAL PROCESSES												
		Energy efficiency	Time behaviour	Overload-ability	Partload-ability	Synchrony	Power gradient - Short timescale	Power gradient - Long timescale	Activation effort	Development state	Overall score	
Chlorine-Alkali production	High	High	Continuous	High	High	Yes	Low	High	Low	Proven	High	
Aluminium production	High	High	Continuous	Medium	Medium	Yes	High	Medium	Low	Conceptual	Medium	
E-steel making	High	High	Batch	Low	High	No (material)	Medium	High	Medium	Conceptual	Low	
Cold storage	High	High	Continuous/Batch	Medium	Medium	Yes	High	Medium	Low	Conceptual	Medium	
Desalination	High	High	Continuous	High	High	Yes	Medium	High	Low	Demo	High	

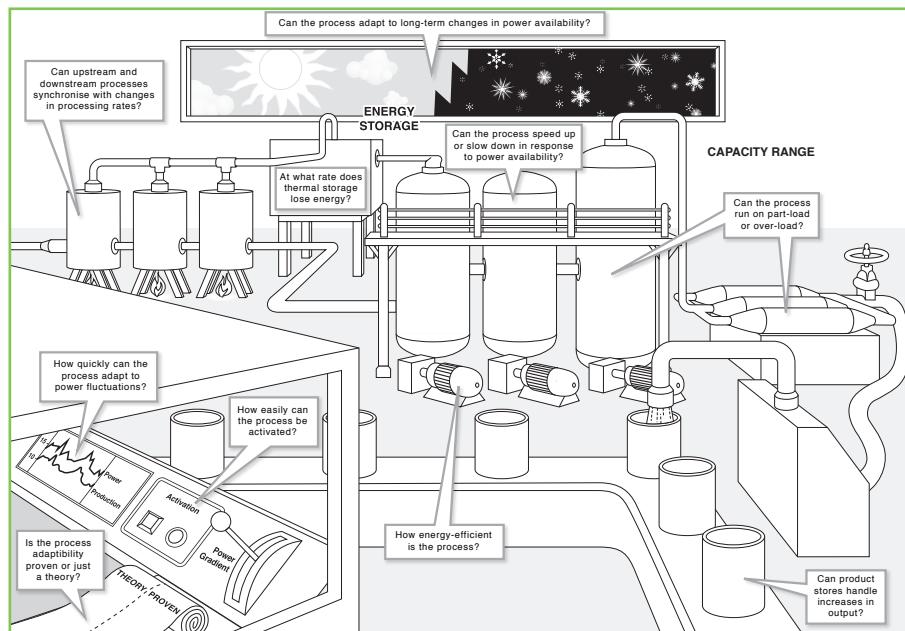
have the required flexibility. A Flexibility Checklist presented in an LE Application Note provides a quick, top-down overview of site's suitability for flexible energy use.

### Ten flexibility criteria

The Flexibility Checklist consists of 10 characteristics that are placed in a checklist matrix and given a traffic light score. It provides a first idea about the feasibility when a project for on-site wind is being scoped. Since it does not investigate the company's processes in depth and is not a final decision-making tool, it should be followed by a more extensive feasibility study. What the checklist can do, however, is quickly identify potential issues and barriers for a flexible energy demand and elucidate whether further investigation is worthwhile.

The checklist includes the following characteristics:

- 1) **Process energy efficiency.** This is required to prevent that an overcapacity of wind power is being installed.
- 2) **Energy storage potential.** Most industrial processes will need some type of storage or buffer to enable a continuation of production for some time when insufficient power is available. If new storage capacity needs to be installed, this is often a substantial cost factor.
- 3) **Time behavior.** Continuous processes tend to be more appropriate for power-by-wind than batch processes.
- 4) **Overload-ability.** The ability to operate an industrial process temporarily at higher rates when excess power is available provides considerable scope for flexible operation



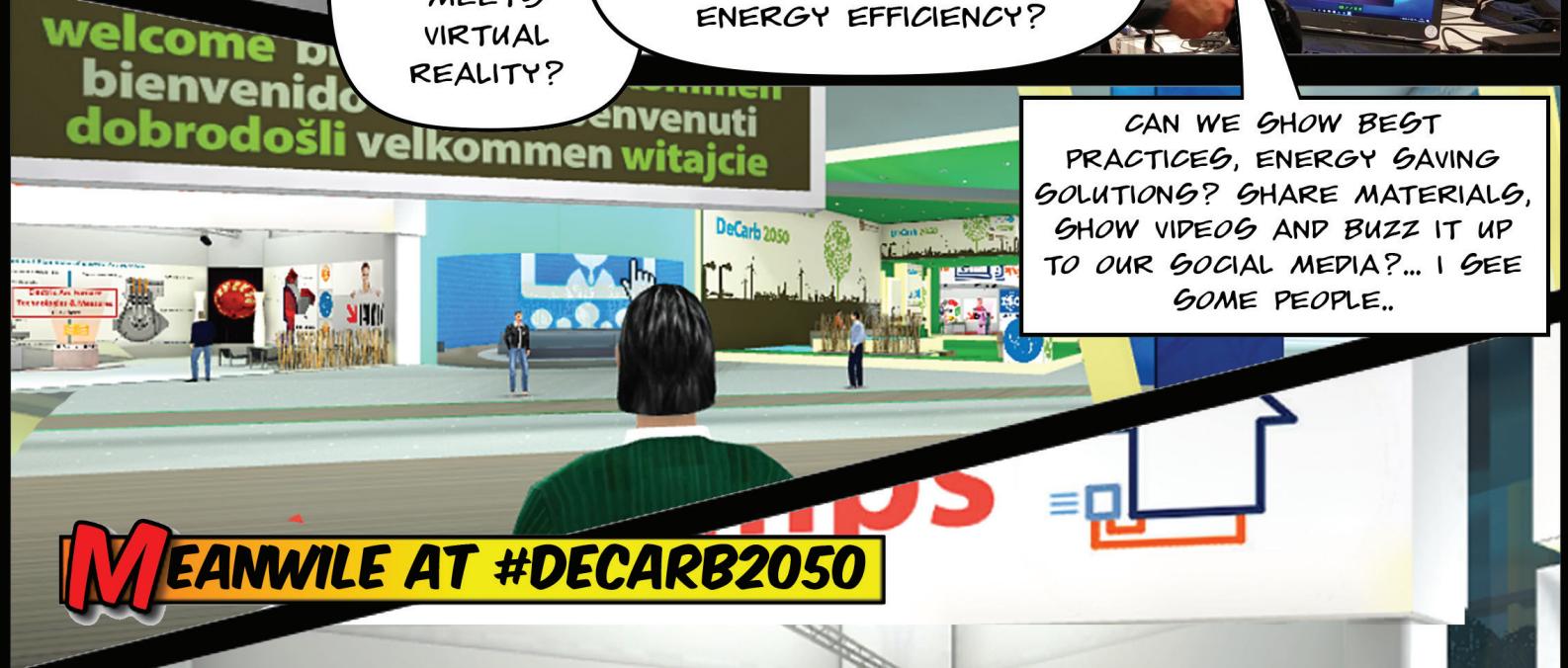
Applying the Flexibility Checklist to a business site

with on-site wind power.

- 5) **Partload-ability.** The ability to run the core process below nominal operation levels in response to dips in energy supply.
- 6) **Synchrony.** If upstream and downstream processes can smoothly and automatically adapt to variations in the rate of the core process, the process provides synchrony. High levels of synchrony make a process well-suited to wind-power.
- 7) **Power gradient – Short timescale.** A process's ability to adapt in minutes or seconds to fluctuations in available power makes it highly suitable to be supplied by onsite wind power. In practice, the ability to adapt rapidly implies overload- or partload-ability.
- 8) **Power gradient – Long timescale.** A process that can adapt continuously to long-term and larger-scale
- changes through overload- or partload-ability is more advantageous than processes where flexibility is only possible in discrete adaptations.
- 9) **Activation effort.** The effort required to start up a process or to shut it down.
- 10) **State of development.** If a process has been proven to operate flexibly, it should be given greater weight by the decision-maker than a process that has merely a theoretical potential to adapt to intermittent power.

Deriving an overall score from these ten criteria requires some insight in their relative importance. As they are not equally important, the overall score cannot be obtained by a simple addition. As a general rule we could state that the energy storage potential and the partload-ability are the most decisive characteristics. ■

# ENERGY MARKETING REVOLUTION... PT6



## MEANWILE AT #DECARB2050





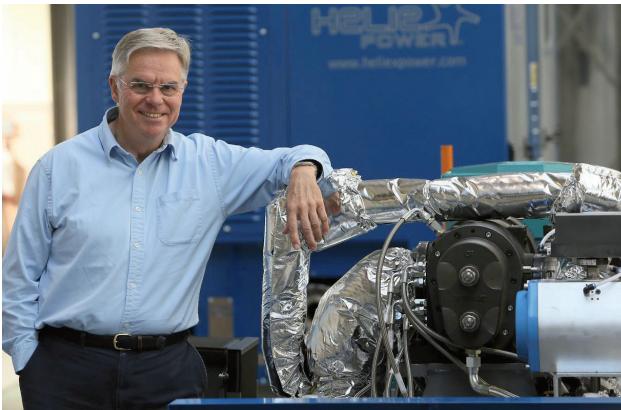
# BEARINGS OPTIMIZATION FOR SCREW EXPANDER SYSTEM

## Schaeffler's cylindrical roller bearings and angular contact ball bearings have been selected by the Scottish manufacturer Heliex Power for use on its energy saving screw expander technology

Schaeffler is supplying cylindrical roller bearings and angular contact ball bearings to Glasgow-based company Heliex Power for use on its innovative range of screw expanders and generating sets, which recapture lost energy from 'wet steam' to generate electricity in an economically viable way. Heliex Power's groundbreaking screw expander technology enables the recovery of energy from waste heat and low-pressure steam found in numerous applications across chemicals, pharmaceuticals, farms, nurseries, glass, steel, distilling, district heating, textiles, food and drink, poultry and waste incineration plants. Although harnessing energy from steam is nothing new, the key innovation in Heliex Power's technology is that it can operate with standard industrial "wet steam" – steam that often contains water droplets that would destroy traditional machines and generators. Due to its patented design, Heliex Systems can generate power, re-energise low pressure steam and drive machinery and air compressors by utilising a factory or building's existing steam supply.

### Usable clean electricity

The Heliex System is a compact, rotary device that converts expansion energy from steam into useable clean electricity via a simple wet steam cycle – the simple thermodynamic cycle of a heat engine that converts heat into mechanical work. The heat is supplied externally to a closed loop,



which normally uses water, or in this case steam, as the working fluid. Heliex Systems operate at 4,500rpm, driving a 3,000rpm asynchronous generator via a toothed belt transmission. In the case of the latest machine, the HP Steam Recompressor, they work in reverse. Having built more than 50 machines and achieved in excess of 120,000 operating hours, the Heliex steam screw expander technology is now proven and accepted across the conservative process industries. Bearings play a critical role in the performance of the screw expander machines. The bearings must withstand harsh operating conditions including high temperatures up to 200°C.

### Schaeffler and Heliex Power

To date, Schaeffler has supplied hundreds of cylindrical roller bearings and angular contact ball bearings for use on both test and development machines at Heliex and for the current range of Heliex screw expander machines and generating sets. Mike Addington, Regional Sales Engi-

neer (Scotland) at Schaeffler UK comments: "Schaeffler UK has been working closely with Heliex Power since the company was spun out from City University in 2010. Initially, we were heavily involved in the engineering design work relating to the optimisation of the bearing arrangements for the steam screw expander system.

We are now supplying bearings on a regular basis to Heliex for its current range of machines, as well as looking at custom bearings for ongoing machine development programmes at Heliex." On the larger range of screw expander machines, Schaeffler supplies four cylindrical roller bearings, one positioned at each end of the two rotor shafts. In addition, six angular contact ball bearings from Schaeffler are located at the end of each shaft to apply the required preload. On the smaller Heliex machines, Schaeffler supplies two angular contact ball bearings for the main shafts and two smaller angular contact ball bearings to apply the necessary preload. There are also four cylindrical roller bearings in this machine – two on each shaft. Dan Wright, CTO and founder of Heliex Power, recalls: "Where appropriate, Heliex uses bearings from Schaeffler on its screw expanders and generators. In my experience, Schaeffler is a good fit for Heliex Power. ■

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# A SLOW ENERGY TRANSFORMATION

By Dr. Joachim Karthäuser, Co-founder and Technical Director at Climeon

To fight global warming, we must come to terms with the fact that our planet is seriously threatened and push to unblock huge investments, which are required to effectively manage the energy transition



**Joachim Karthäuser,**  
Co-founder and Technical Director at Climeon

Global warming is a fact. There is now no doubt at all that CO<sub>2</sub> emissions, caused mainly by fossil-based energy, are the villain. Melting ice from Greenland and the world's polar regions will likely, within 2-3 generations, lead to sea levels rising by 6 meters. Unfortunately, this pace is likely to accelerate, to the extent that both the North and South Poles will melt completely. If the ice on Antarctica melts, sea levels will rise by 60 meters. Even at a 6-meter sea level rise, the consequences are disastrous, enough to make millions of citizens, for example in New York, Tokyo, Shanghai, Singapore and London, homeless. Low level

countries such as Bangladesh, Vietnam and the Netherlands risk being wiped out completely. The accompanying climatic and oceanic changes will make the situation even worse: the Mediterranean and the Middle East could both become uninhabitable, resulting in huge refugee flows and crises. The global food supply is threatened because vegetation simply does not now have enough time to adapt to a new climate.

Globally, nations take action through international climate plans, such as the Kyoto and Paris agreements. And there is certainly agreement that we urgently need to change our energy systems. Yet rising global energy consumption, combined with low energy prices, fosters wastefulness. The real battle between the countries responsible for climate change has not even begun. Understandably, the least developed countries are pointing at their right to prosperity and at the affluent world's historical responsibility for CO<sub>2</sub> emissions. Energy consumption is therefore likely to continue to rise. The late Professor Hans Rosling's conclusion is that we must develop and provide technologies such as refrigerators, automobiles and washing machines that require a maximum of 10% of today's energy needs, in order to realistically meet environmental objectives. Such restraints may feel a deceptively long way away to us at the moment.

## Some enlightenments

How can we explain the discrepancy between the clear risk of the increasing momentum towards a collapse of the climate, and the lack of commitment to activities to solve the problems? There are two important reasons:

1. Psychology: If a threat seems too daunting, then denial of the threat is a built-in reflex, especially if the threat is linked to an addiction. A smoker or alcoholic tends to ignore warnings from doctors, against their better judgment. We depend on energy for comfort, air travel and prosperity. In the same way that a smoker denies the threat of lung cancer because the pleasure of nicotine is so strong, we ignore the fact that rising sea levels are threatening the very existence of mankind. The pleasures that energy gives us in the short term are simply too powerful. The same psychology applies in politics and business: our decisions are usually short-term. Drastic decisions require broad consensus and often only come about when we have the knife at our throat. It is tempting to take the easy way out and commission yet another investigation of the threats of climate change, deferring the time when the sitting government or board will have to deal with the problem. But there is hope. Most



governments are using means of control such as alcohol and tobacco tax with great success to mitigate the effects of dangerous behaviors. We will return to means of control shortly.

2.Understanding: Far too few people remember basic physics that easily shows that energy today is in fact absurdly cheap. 1 kilowatt hour (1 kWh) is the amount of energy required to lift a large car all the way up to the top of the Eiffel Tower! We consumers can purchase this enormous amount of energy for about 0,1 D or 1SEK, either in the form of electricity or as one deciliter of petrol! The alternative to lifting the car with a crane is to ask say 50 Frenchmen to do the job with ropes and muscle power: this would surely cost hundreds if not thousands of euros. Is there any other product where we get so much value for so little money? (One could argue here that access to cheap energy made it possible to abolish slavery.) Other comparisons: With 1 kWh, one can in half an hour of vacuuming move a few grams of dust from the carpet into the filter bag. The comparison with the car on the Eiffel Tower shows that our vacuum cleaners and other electric gadgets are far from efficient - there

is lots of room for improvement for future engineers! As for global conflict management, as Daniel Yergin writes so persuasively in "The Prize", historically, there are hardly any wars where oil, gas or coal are not there in the background. Unless future solutions are reasonable and fair for all stakeholders, war is inevitable. Much deeper knowledge of politics, history, physics and psychology of energy is required if we want to take the right decisions going forward.

### An urgent transition

Is there hope that we can manage the energy transition? Yes, but it is extremely urgent. In fact, there is inspiring progress that showcases human creativity in response to this serious situation. The World Wildlife Fund (WWF) regularly identifies "Climate Solver Technologies". Winners include projects transforming desert into farmland, new ways to save, produce and store energy, to distribute food and goods efficiently, and many more examples. Electric and hybrid cars are reaping success. Passenger ferry Viking Line has a new ship in operation driven by natural gas or biogas, which only uses 50% of the energy that a similar vessel needed just 10 years ago. China, California and Germany are leaders investing in wind, solar and other re-

newable energy sources. We can build zero-energy houses, as well as technology to reduce energy consumption dramatically in existing houses. Sweden is one of the world leaders in clean energy innovation. Companies such Greenely have developed methods to reduce energy consumption with the help of psychology. ABB provides frequency-controlled motors that cut electricity requirements. Uppsala University is a leader in solar cell innovation. And the company I started, Climeon, can produce clean electricity from waste warm water. The world as we know it can build smart grids. We can store energy in all possible forms. All this is hugely positive and inspiring, but it is not enough to stop climate catastrophe. How, realistically, can we increase the pace? Many nations have opted for a passive, cautious stance - we keep old technologies and sources like nuclear power longer, arguing that these assets have many years of life left to go, and that there are many jobs involved. There is logic in this, and it obviously saves money. The problem is that the money saved is not invested in new technology. A green tax seems very urgent. In summary, we must come to terms with the fact that our planet is seriously threatened. ■

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# HIGHER EFFICIENCY SOLUTIONS IN THE SPOTLIGHT

**At Adipec 2017 will take place the annual Huawei Global Energy Summit under the theme 'Leading New ICT for Higher Safety and Efficiency in the Oil and Gas Industry'**

The Huawei Global Energy Summit 2017, an annual event held since 2015, will take place in Abu Dhabi on November 12, 2017. Huawei will also demonstrate its innovative ICT solutions for the oil and gas industry at the world-renowned Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) 2017 show from November 13 - 16.

The theme of the Huawei summit is 'Leading New ICT for Higher Safety and Efficiency in the Oil and Gas Industry.' Today's oil and gas industry is facing tremendous changes and challenges. Oil and gas companies and investors must rethink how to use the latest technological and managerial innovations to reduce costs, control risks, ensure secure operations, and usher in sustainable development. Innovative ICT technologies can play a key role in digital transformation of the oil and gas industry. Huawei, a leading global ICT solutions provider, is committed to providing more efficient and secure solutions to the oil and gas industry.



## Energy efficiency in the Oil & Gas industry

ADIPEC, the most influential event for the global oil and gas industry, will be held in Abu Dhabi. More than 100,000 trade professionals, 2,200 exhibitors, 15 multinational oil giants, as well as industry think tanks, energy ministers and executives from 135 countries and

regions will gather for ADIPEC 2017. They will discuss the new challenges and opportunities for the transformation of the global energy industry and share actionable insights into high levels of innovation and development. At the ADIPEC event, Huawei will work with industry partners to demonstrate a series of integrated innovative solutions, such as advanced High Performance Computing (HPC) for reservoir simulation and seismic processing, oil and gas IoT, digital pipeline, and intelligent transportation and distribution. These solutions will boost the oil and gas industry's transition to smart technologies and operations. ■



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Stand: 12250



# TOWARDS ZERO EMISSION MOBILITY IN EUROPE

By Dusan Jakovljevic, Policy Director EEPI, Brussels, Belgium

Thirteen companies and industry associations from Europe have joined forces and identified key tasks on the upcoming European Union Low Emission Mobility Package



Dusan Jakovljevic,  
Policy Director of EEPI

Representing the zero-emission mobility industry, thirteen companies see the second part of the 'Europe on the Move' mobility package announced for November as a unique opportunity for the European Union to once again lead the shift to decarbonise vehicles. By proposing an ambitious car and van CO<sub>2</sub> regulation for post 2020, the EU would drive jobs, growth and innovation across the economy. The EU has agreed a long-term vision that should drive emissions reductions and has signed the Paris Agreement which requires signatory countries to limit global temperature rise by cutting overall emissions by 80 to 95 percent

by 2050. In order to achieve this, all light duty vehicles must be zero emission by 2050. As vehicles stay an average of 15 years in the market, 100% of sales need to be zero emission by 2035. On the basis of this, the governments of France, the UK, the Netherlands, Norway and Austria have publicly announced the phasing-out of combustion engines well before 2050. To help make this happen and to accelerate Zero Emission Vehicle sales the EU needs to set a 2-fold policy in the November package:

to struggle to reduce CO<sub>2</sub> emissions (emissions in 2014 were 300 megatons greater than in 1990) and oil dependency (the EU imports 87% of crude oil and road transport consumes 47% of the total) and to improve energy efficiency. Combustion-based transport also negatively affects urban air quality: 5.4% of deaths in Europe are due to air pollution. Zero Emission Vehicles contribute towards providing the clean, energy-efficient and affordable transport needed to reduce emissions.

- First, to accelerate Zero Emission Vehicles deployment, the EU needs to set a mandatory sales target for 2025 and 2030. The transport sector accounts for 33% of final energy consumption in the EU. It continues
- Second, the EU should set ambitious CO<sub>2</sub> targets for 2025 and 2030 for cars, vans, and in 2018 also for lorries and busses. CO<sub>2</sub> targets for cars and vans have proven to be the





single most important driver for car manufacturers to produce cleaner cars. They form the basis for technology neutral emission reductions in the road transport sector. CO<sub>2</sub> emission targets for road vehicles should be set in such a way that emission reductions of 9% annually are achieved by 2030, the levels needed to meet the Paris Agreement goals.

### A mature technology

Zero Emission Vehicles are now a mature technology, ready to scale up to mass market. This is confirmed by many car makers' recent announcements that they intend to widen their Zero Emission Vehicle offers, i.e. battery electric and fuel-cell vehicles. The current range of Zero Emission Vehicles is between 200 and 450 km, with the total cost of ownership expected to fall below the internal combustion engine equivalent by early 2020s. A significant condition for mass market uptake is a high-power charging network, as well as supporting hydrogen refuelling infrastructure, along and beyond the TEN-T Core

Network. Building a sufficiently dense normal and fast charging network enabling the parking and charging of vehicles also drives the deployment of shared, more efficient and connected mobility, which in turn enhances the electrification of vehicles.

### Zero-emission mobility

By setting a Zero Emission Vehicle target, in combination with very ambitious 2025 and 2030 CO<sub>2</sub> standards driving vehicle electrification, the EU would support a growing domestic zero-emission mobility industry with high innovative potential which would return the EU to being among the leaders in this field. Recent studies suggest that promoting the shift to electric vehicles would lead to a 1% increase in EU GDP, and create up to 2 million additional jobs by 2050 (850.000 by 2030) in the wider economy due to an increased automotive suppliers value chain and higher demand on energy supply. In order for Europe to lead in the uptake of electric vehicles it will be crucial to drive innovation efforts towards the next generation of batteries and fuel cells, coupled with policy encouraging

their performance and the development of EU-based technology know-how (e.g. energy density, better use of raw material and chemicals, lower carbon foot print, safety, recycling, refuelling/charging speed).

Without creating a sufficiently large integrated market for Zero Emission Vehicles in Europe, growth and value added will remain confined to other world regions. China has already announced a Zero Emission Vehicle mandate from 2019 onwards, aiming at 20% of all sales by 2025. The EU now has an excellent opportunity to ensure it does not fall behind by equally introducing a quota – studies have indicated that a similar quota of around 20% by 2025 would be appropriate.

This is an opportunity for the European Union to lead boldly during this transition with many uncertainties by sending a strong signal to European industry and to European citizens. Representatives of the zero-emission mobility industry remain committed to working with the EU to ensure that the 'Europe on the Move' mobility package unleashes its full potential. ■



# EFFICIENCY POTENTIAL OF INDUSTRIAL HEAT PUMPS

By Thomas Nowak, Secretary General at European Heat Pump Association AISBL (EHPA)

The technical potential of heat pumps can be huge and operation cost savings are possible. This assesses the realistic prospective of heat pump applications



Thomas Nowak,  
Secretary General at EHPA

Heat pumps are considered large if they exceed capacities of 100kW. They can easily reach the one to several megawatt range with the largest units providing 35MW in a single machine.

Currently available heat pump technology can provide heat up to 100°C with a spread between source and sink temperature of approx. 50 K per stage.

Using heat pumps for applications above 100°C is still a challenge. While the underlying principles are known and prototypes for these temperature levels exist, they are not yet available in standard products. The current level of research and development projects as well as increased interest by new players to engage in the

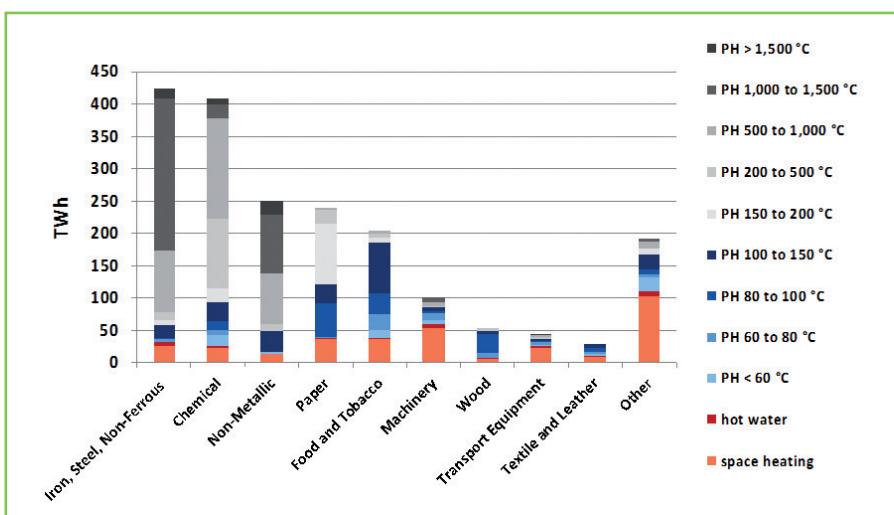
segment of large heat pumps leaves room for optimism. New and improved products are expected in the market. Without existing solutions for heat pump applications for temperature levels above 150°C this segment has not been included in the current potential assessment. With this in mind, available data from Eurostat for was evaluated to determine the potential for the application of heat pumps in industry. 2012 data for EU-28 reveals, that the industry is using 3200 TWh of final energy and has a demand for heat of approx. 2000 TWh. Figure 2 shows the split of this heat demand.

This assessment reveals a practically reachable potential for heat pumps in the temperature range up to 100°C of 68 TWh, mainly in the chemical, paper, food/tobacco and wood industries (see blue

shaded bars in fig. 2). Adding the sectors of hot water and space heating reveals an additional 74 TWh (see orange shaded bars in fig. 2). With technical progress, an additional potential of 32TWh in the temperature range from 100 to 150°C can be made accessible (see darkest blue bar in fig. 2). In total, 174 TWh or 8.7% of all heat demand in industry can be provided by heat pumps. The higher temperature ranges shown in grey in the graph above remain inaccessible for heat pump technology.

## Potentials for heat pump applications

The result of this assessment shows the realistic potential of heat pump applications. The technical potential is much larger, but can often not be fully used



Distinction of heat demand in industry by sector and temperature range

due to practical considerations. A more refined model based analysis, executed by Wolf and Blesl, comes to the conclusion that the technical potential of heat pump used in industry across the 28 EU member states is 1717 PJ (477 TWh), with only 270 (75 TWh) or 15% of it being accessible if economic and practical considerations are applied.

Thus the model based approach leads to a larger technical potential, but to a much lower economic potential.

Main factors influencing the economic perspective of heat pump operations are:

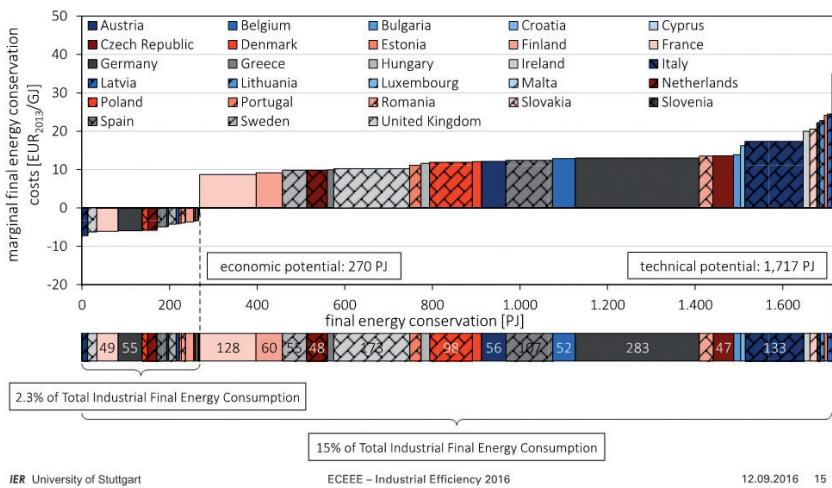
- Cost of fossil fuels
- Cost of electricity
- Interest rate
- Efficiency of the heat pump system
- Simultaneous availability of heat supply and heat demand, simultaneous demand for heating and cooling
- Investment cost differences.

Operation cost savings from heat pump use are possible, if the relative cost of fossil fuels and electricity are smaller than the efficiency of the heat pump system. With a rather distorted energy price, this is more and more difficult, as many governments recover the cost of greening the electric system via electricity cost itself. At the same time the price for fossil fuels does not reflect the negative environmental impact of its use. Thus relative cost of heat provision points in favour of fossil fuels.

Since there is a direct relation between energy demand reduction and CO<sub>2</sub> emissions, extending the economic potential of demand reduction will also reduce CO<sub>2</sub> emissions from the industrial sector. The study concludes a total CO<sub>2</sub> emission reduction potential of 86.2 Mt with 21.5 Mt (25%) of it economically viable.

## Industrial Heat Pump Potential in EU-28

Final energy conservation potential for HPs in the EU industrial sector



## Industrial heat pump potential in EU-28

### Obstacles, challenges and opportunities

Main obstacles limiting the use of heat pump in industry are as follows:

- Extreme requirements on a return of investment, often not more than 2 years are accepted. This is further complicated by a comparatively low price for fossil energy.
- Risk aversion, in particular vs. heat pumps which are not trusted, but perceived as a new, unproven technology.
- Limited or no availability of best practise examples that could create trust in new solutions.
- Structural barriers in the industry:
  - High transaction cost for the conversion of processes, as many old processes are based on steam
  - Need to integrate competences and responsibilities to realise a systems perspective in order to energetically optimise industrial processes and commercial applications

Both the energy savings and CO<sub>2</sub> abatement potential of heat pumps in

industrial applications is still largely unused. Creating more favourable political framework conditions will allow to reverse this trend. These include:

- Adding a price signal to the use of fossil fuel
- Reduce the burden from tax and levies on increasingly clean electricity
- Provide low interest rates and loan guarantees to energy efficient investments using low carbon emission technologies such as heat pumps
- Increase research and development on standardized heat pump solutions for the identified industrial sectors
- Provide more best practise examples.

There is a joint effort necessary from policy makers and industry alike to develop the technical and economic potential of heat pump applications in industry. It needs both to pull on the same string (and in the same direction) to fully unleash the potential. ■





# ALL THE BENEFITS OF ENERGY EFFICIENCY

**The value of energy efficiency is still underestimated, even if it goes beyond energy saving. Benefits include macroeconomic development, public budgets, health and well-being, industrial productivity and energy delivery**

Energy efficiency is a major area of focus and its importance was highlighted at COP 22 in Marrakesh, when the World Energy Council published 'Energy Efficiency: A straight path towards energy sustainability'. This report highlighted that there is still much progress to be made for energy efficiency in helping to reduce global energy emissions as agreed at COP21 in 2015.

One challenge is that growing economies don't often have the resources to spare to develop energy efficient solutions. The truth is, seen from a purely economic perspective, some companies perceive energy efficiency measures as an increased risk. This is because of a need to change processes or replace process equipment. However, energy efficiency can deliver value beyond energy savings, as explained in the International Energy Agency (IEA) publication "Capturing the Multiple Benefits of Energy Efficiency". Benefits include macroeconomic develop-

ment; public budgets; health and well-being; industrial productivity; and energy delivery.

## Why energy efficiency is important

Energy efficiency measures output against energy consumed. Evidence shows that improved energy efficiency can deliver benefits across the whole economy, impacting GDP, employment, trade balances and energy prices. Not only does it reduce energy demand and costs but it can also contribute to improved industrial productivity.

From my own experience of installing ABB drive technology at an engine factory in the UK, employees reported that they enjoyed their work environment more. Not only did the drives reduce overall energy demand but they also eliminated other negative side effects of energy loss like heat and noise. This led to an overall increase in the factory's productivity.

energy resource. In 2010, energy efficiency achieved a milestone when it became the largest single energy source for IEA countries, exceeding oil, gas, coal and electricity. However, there is often a 'rebound effect' where savings can result in growing demand that counteracts the energy efficiency measures. While this can be seen as a persistent challenge to energy efficiency, rebound can also be positive. One example is a South African farmer who gained 40 percent energy savings from installing variable speed drives in his irrigation system. He then went on to reinvest his savings in more variable speed drives.

## Energy efficiency in industry

Industry accounts for one-third of the global final energy demand – so any improvement in energy efficiency has great potential to contribute to the bottom line. By investing in energy efficiency, industrial operators gain benefits of enhanced competitiveness and profitability, reduced resource use and pollution, improved production, product quality and working environment, and reduced operational and maintenance costs.

These represent improved productivity and contribute to wider political objectives such as combatting climate change and promoting economic development. When making the case for investment, quantifying the benefits can be complex as energy efficiency crosses multiple process steps, each of which have their

## First fuel and the rebound effect

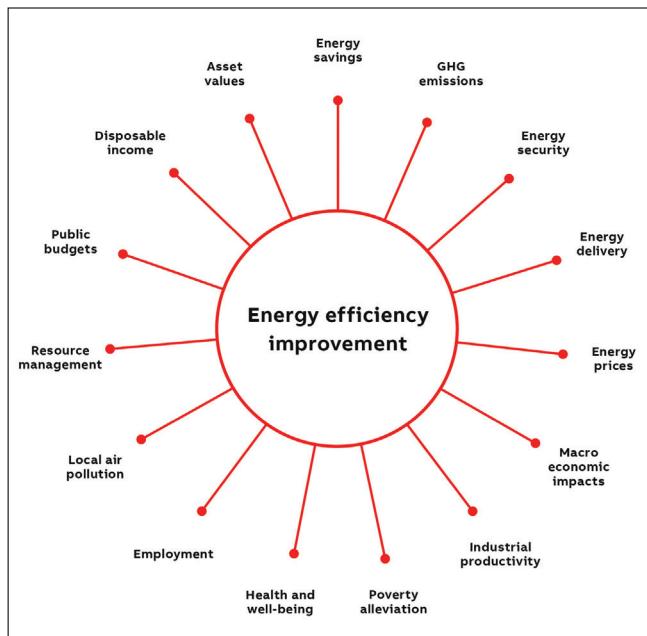
Seen from the context of sustainability targets, energy efficiency is a major energy resource. Whereas it was previously viewed as a 'hidden fuel', or a negative quantity of energy not used, it is increasingly being recognized as a 'first fuel'. This has led energy efficiency to become a major



own energy needs. Operators often make decisions based on simple payback time. However, the expected annual profit can be better than payback as a way to evaluate investment.

### A bright future for energy efficiency

In spite of huge investment in renewable energy, many millions of tons of fossil fuels are still burned to generate electricity, releasing carbon dioxide into the atmosphere. By using energy more efficiently, we could deliver half the cuts in emissions needed to slow climate change over the next 25 years. To give a sense of what can be achieved, the most efficient economies generate 16 times more GDP with the same amount of energy than the least efficient. Energy efficiency can deliver tangible social and economic improvements but communicating its value is a



*Note: This list is not exhaustive, but represents some of the most prominent benefits of energy efficiency identified to date*

challenge. Talking about what improved energy efficiency actually delivers can help stakeholders grasp its impact and value. Industrial motors use 45 percent of all electricity and the ideal scenario for energy efficiency is for all motors to be the highest efficiency class and controlled by variable speed drives. However, new investments are often expensive, leav-

ing operators with a choice. We typically find that operators find greatest energy efficiency savings by focusing on the installations that enable operators to gain small savings over a long annual running time rather than large savings on their investment motor with low annual running hours. The wider benefits of energy efficiency have enabled man-

ufacturers to optimize their consumption of raw materials, improve working conditions and enhance reliability and throughput times. However, there is still a significant challenge in demonstrating what can be achieved before investing in energy efficiency. ■

► 53762 at [www.ee-bi.com](http://www.ee-bi.com)

# FOR A DIGITAL VISION



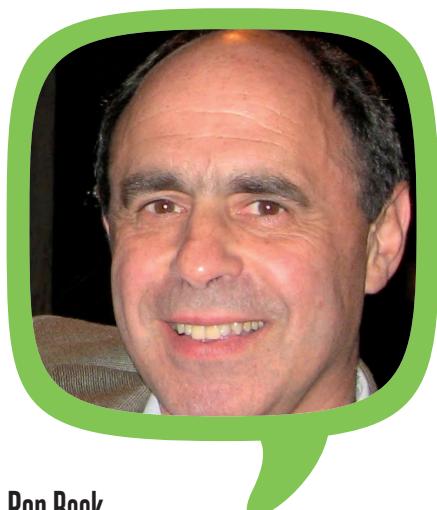
[WWW.TIM-EUROPE.COM](http://WWW.TIM-EUROPE.COM)



# SUSTAINABLE GROWTH IN BAHRAIN

By Ron Beck, Industry Marketing Director at Aspen Technology

The fourth Middle East Process Engineering Conference took place in Bahrain. Ahmad A. Al-Sa'adi, Senior Vice President of Saudi Aramco's Technical Services, illustrated the company roadmap for sustainable long-term growth through innovation



Ron Beck,  
Industry Marketing Director at Aspen Technology

ees registered. About 300 attended the opening plenary session. Many people may have felt that the opening by the Bahraini Minister of Oil and several senior Saudi industry executives would be all fluff, and stayed away. They missed out. In reality, the speech, in particular, the one provided by Saudi Aramco's Ahmad A. Al-Sa'adi, Senior Vice President of technical services, was substantive, thought provoking, and sends a clear message across the Gulf region and to international organizations represented there. Saudi Aramco, a company with very substantial energy assets, world class process facilities across the supply

chain (from well to petrochemical plant and gas station), and formidable financial resources, is laying out a roadmap that they feel will position them for sustainable long-term growth through innovation.

Al-Sa'adi laid out an interesting Aramco company strategy, backed that up with a few noteworthy statistics, and mentioned a few highlights, with metrics, of results to date.

For those outside the region, who feel that the Saudi Oil "game" is simply to consider different strategies related to oil production rates and oil prices, you have very seriously over-simplified the business and economic forces at

It's October, the weather is (as usual) hot and humid in Bahrain, though at 5am it's just dawn and refreshing enough to take an early am jog past the Mosque and along the water. (No traffic at that hour). For the fourth time in eight years, leading operators, technology providers, and software suppliers, gather to talk process engineering innovation, adoption and best practices, at the biennial MEPEC conference. The fourth Middle East Process Engineering conference got underway in Bahrain, with about 1800 total attend-





work, have failed to consider the ambitions, intellectual capital and resolve to succeed at work, and are missing some interesting and important trends related to the accomplishments to date of Saudi Aramco, and other regional oil and petrochemical players, and their future vision.

From the first time I was invited to visit the Saudi Aramco central visualization center, or “command center”, in Dahram, Kingdom of Saudi Arabia, on a visit six years ago, I have felt that Saudi Aramco has a much stronger vision of where technology can take them as an organization than people realize, and a very clear idea of how to make the best uses of any resources and money spent to adopt and employ technology in the service of their energy business.

This was made clearer in Al Sa’adi’s brief remarks, which while understandably brief and detail-free, yet were laced with enough specific examples to make clear the practicality and achievability of Saudi Aramco’s goals.

## Initiatives

Al Sa’adi laid out a few key initiatives being undertaken, namely:

- Innovation and technology leadership
- Digitization
- Capital efficiency
- And Operational Excellence and reliability.

## Innovation

In support of Al Sa’adi’s discussion of Aramco as a technology leader, he threw out to the audience a few nuggets. Aramco is now funding three worldwide R&D centers, in Cambridge, MA, USA, in England, and in China. These R&D activities have yielded some 450 patents in the past year. Quite beyond that, Saudi Aramco has funded 25 startup technology ventures, and recently acquired one such technology, a chemical product line called Converge, which converts waste CO<sub>2</sub> (a greenhouse gas) into polyol. As part of this discussion Al Sa’adi also mentioned Saudi Aramco’s lighthouse program to drastically reduce its gas flaring in its production fields to one of the lowest in the upstream industry.

## Digitization

Saudi Aramco is also pursuing disruptive digital technologies that can help greatly improve profitability. Saudi Aramco is citing an early success in use of data analytics in their processes that he states have reduced maintenance costs by 10%.

Also, he mentioned the application of advanced process control (APC) with the goal of achieving upstream production cost savings of 23%.

## Capital efficiency

Saudi Aramco is investing heavily in new methodologies, in both the project management area and in the cost

estimating area, to greatly improve capital efficiency. Areas mentioned by Al Sa’adi included the kinds of project execution systems, and “front end loading” approaches previously championed by the US-based EPCs that have been employed for the megaprojects in the region, and by Saudi Aramco’s close partner, Dow Chemical Company. Al Sa’adi also mentioned an emphasis on value assurance and a constant monitoring and evaluation of world market conditions.

## Operational excellence and reliability

Finally, Al Sa’adi mentioned Saudi’s very strong focus on operational excellence. One of the technologies employed here has been AspenTech’s Fidelis reliability, used to select operational excellence targets for improvement.

This thought-provoking speech, and call to action to his fellow Middle East operating companies, was all presented in front of the backdrop of a large MEPEC banner proclaiming the themes of the conference in 2017 to be “Innovation” and “Sustainable Growth.” Certainly a strong, and credible statement, that Saudi Aramco has a vision and pathway to employ technology leadership and innovation to stay at the front of the global conversation in the energy economy and process industries. I found myself feeling inspired that AspenTech continues to play a key role as a supplier of many of the key software technologies that are being employed by ARAMCO in this journey. And, this speech alone, delivered in a low key and modest way, was for me worth the 14-hour trip from Boston to Bahrain. ■



# PRODUCTS & SOLUTIONS

## Cargo Battery for E-Cargo Bikes



Transporting loads that are much larger or heavier than those usually moved on two wheels places unique demands on bicycles and on individual components. This is especially true of batteries. If classic in-bike installation isn't required, BMZ's Cargo Battery is able to offer high capacities of over 1.5 KW. BMZ ensures a stable mount using an aluminum continuous cast C-Profile developed in-house. A Twin Core (2 batteries in parallel) is available using a switch. The battery has a breathable housing and an intelligent charger for various configurations with 7S-14S. UART and CAN protocols are available. The ergonomic housing and handle have been improved. The Cargo Battery also has an improved locking mechanism, and is downwardly compatible with previous Cargo Batteries. With BMZ Drive Systems, BMZ GmbH offers a system solution combining a display and motor with a lithium-ion battery and charger adapted for E-bikes. BMZ Drive Systems has been installed in major international bicycle brands for many years. In addition, BMZ also offers service & support.

### ► BMZ Group

► 53764 at [www.ee-bi.com](http://www.ee-bi.com)

## High Performance Bevel Gearbox Range Extended with New Size



A new size, the P-65, has been added to the Graessner PowerGear P range of bevel gearboxes available from Bedford-based Drive Lines. Being 65mm cubed in size it is expected to prove very popular in a wide range of applications, such as for use with screw jacks to create vertical lifting and lowering mechanisms. With miniature sizes recently added to the standard range, Graessner PowerGear P units are now available in 12 sizes from P27 to P450. They are all of identical design and use and optimised bevel gear geometry that delivers increased torque and high efficiency in a compact and lightweight package. These high performance gearboxes are available in flange, solid or hollow shaft versions. PowerGear P gearboxes feature high torque and low to medium input speeds, in a sturdy, rigid design that ensures the highest performance while being space and weight efficient. The optimised gearing delivers high torque ratings up to 7000Nm, while an optimised contact pattern assembly delivers uniform load distribution for increased reliability and longer life. The gearboxes are available in four configurations.

### ► Drive Lines Technologies

► 53765 at [www.ee-bi.com](http://www.ee-bi.com)

## Smart Housing in High Current Connected Air Circuit Breaker



Schneider Electric has selected DuPont™ Zytel® for the creation of a high dielectric strength housing for the high precision current (A) sensor in its new connected Masterpact MTZ circuit breaker. The application of Zytel® illustrates DuPont's ability to provide cutting-edge materials for smart devices and the Internet of Things (IoT), and create innovative solutions to customers' challenges. This new halogen-free and UL certified self-extinguishable grade, Zytel® FR95G25V0NH, meets Schneider Electric's key requirements and exhibits outstanding performance over a long period of time. Furthermore, the use of Zytel® has resulted in a step change performance improvement of the high precision current sensor in Schneider Electric's air circuit breaker. The Class II or Double Insulated current sensor secures Class II circuit breaker as per International Electrotechnical Commission (IEC) and Underwriters Laboratory (UL) standards, made possible with Zytel®. DuPont and Schneider Electric worked together on the development of this solution.

### ► Du Pont

► 53772 at [www.ee-bi.com](http://www.ee-bi.com)

# PRODUCTS & SOLUTIONS



## Filtration Solutions to Remove Contaminants



The Filtration Division of power management company Eaton presented its high-performing filtration solutions to remove contaminants from different cleaning and water treatment processes in industrial production workflows. Process fluids include, inter alia, metalworking and metal parts cleaning fluids, aqueous and solvent based cleaners in parts washing equipment, pre-treatment baths as well as top coats, clear coats and primers. Using any of these filtration solutions help keep process fluids reliably clean and production operating at peak efficiency. One highlight is the three new Max-Load™ filter bag ranges. Pleated, melt-blown and coreless types extend Eaton's high-performance and versatile filter bag offering. For an ideal combination of quality, performance and safety Max-Load filter bags can be used in Eaton Topline™ single bag filter housings and Maxiline™ multi-bag filter housings. They are designed for a large variety of applications and feature a side inlet, flow through top for optimum sealing of the filter bag.

### Eaton

► 53774 at [www.ee-bi.com](http://www.ee-bi.com)

## High Efficiency Filters for Speciality Inks



Amazon Filters has supplied a leading speciality ink manufacturer with SupaPleat II cartridge filters to ensure the high quality of the UV curing inks they supply through their own sales channels and to third parties selling inkjet printing systems. Previously the company had used pleated polypropylene filters, supplied by a different filter supplier, but trial work demonstrated that switching to Amazon's SupaPleat II ink filters offered significant cost savings. Now all inks in the Speciality Ink manufacturers' packaging process are filtered through Amazon Filters 10-micron SupaPleat II ink filters. The new system, consisting of two 10-inch cartridges and a blanking adaptor inside a filter housing, enables filtration of a 1000kg batch of UV curing ink in around 45 minutes. The high surface area pleated design of SupaPleat II ink filters is widely proven to suit industrial processes where high levels of efficiency are required, whilst maintaining extremely low-pressure losses. In-house research and development has optimised this exceptionally efficient filter media to give higher levels of porosity and excellent quality.

### Amazon Filters

► 53775 at [www.ee-bi.com](http://www.ee-bi.com)

## Multipoint Thermal Flow Meters for the Most Demanding Environments



Designed specifically for flow measurement in round pipes or stacks of 12 inches [300 mm] and larger diameter, and square or rectangular ducts with cross sectional area of 100 inches [250mm] and larger, the model ST102A Flow Meter and the new MT100 Series Flow Meters from Fluid Components International (FCI) provide two to eight non-clogging, no moving parts sensing points that ensure superior accuracy repeatability and reliable operation. FCI's advanced multipoint air/gas thermal flow meters combine state-of-art electronics technology with application-matched, precision flow sensors and calibration in a rugged package designed for the most demanding plant operating environments. They are also always dual-function, providing both flow rate and temperature of the process. The multiple FCI thermal dispersion sensors are inserted at various depths within a pipe or duct and their outputs are multiplexed and averaged to produce the flow rate within the process line. Where dual point sensing is sufficient, the ST102A Flow Meter is the ideal solution. In more complex applications, the MT100 Series Flow Meter provides up to eight sensors.

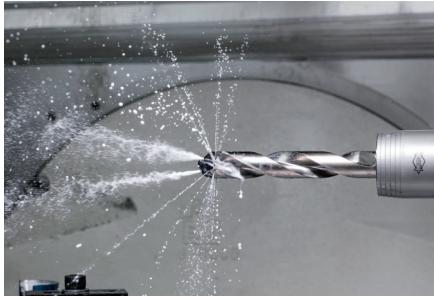
### Fluid Components International

► 53776 at [www.ee-bi.com](http://www.ee-bi.com)



# PRODUCTS & SOLUTIONS

## Odorless Cutting Fluids for Efficiency in Machining and Cleaning



Bonderite dualCys is part of Henkel's comprehensive portfolio of process solutions for the metalworking industry that can be tailored to the precise needs of customers across their entire value chain from casting and machining to assembly. The innovative dualCys technology offers significant improvements in all competitive criteria, including time, fluid and energy consumption as well as product quality and process safety. Essentially, it leverages the synergies between the process fluids by recycling the cleaner into the lubricant bath rather than discarding it as waste. Inspired by the bactericide-free dualCys technology, Henkel has developed an entire range of standard and specialized, one-component products: Bonderite L-MR 20717 is the all-rounder, suitable for nearly every machining operation, to include a wide variety of operations and materials; Bonderite L-MR 21164 is designed for the machining of various specialized materials such as brass, copper, zinc-coated, aluminium alloys, and pure magnesium. It also provides stability in very hard water conditions.

► Henkel

► 53777 at [www.ee-bi.com](http://www.ee-bi.com)

34 | energy efficiency

## Embedded Box PC with Intel® Quad-core i7 or i5 Processors

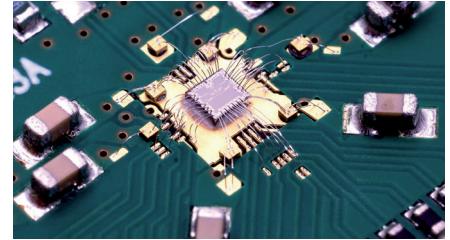


The Embedded Box PC TANK-870e-H110 from ICP Deutschland are energy efficient, compact and extendable. The TANK-870e-H110 convinces with high-performance Intel® quad-core i7 or i5 processors (max 32GB DDR4 SO-DIMM memory) and is very energy efficient at the same time due to the max. 35 watts TDP. Embedded in a fanless and compact aluminum housing with the dimensions of 132x255x190mm, the TANK-870e-H110 is equipped with three expansion slots by default. There are three backplane variants with PCIe x4, PCIe x16, PCI and two full-size PCIe Mini card slots available. Via the internal power connection (max. 36W) add-on cards can be supplied with sufficient current (5V or 12V). The front I/O interfaces include four USB 3.0, two isolated RS-232/422/485 (overvoltage protection up to 2.5KV), two RJ-45 GbE LAN and audio. Two independent displays can be connected via VGA and HDMI 1.4 (4K UHD) interfaces. The extended voltage input 9VDC ~ 36VDC and the temperature range -20° C to + 50° C as well as the vibration protection according to MIL-STD-810G allow the TANK-870e-H110 to be mounted directly on the machine.

► ICP Deutschland

► 53778 at [www.ee-bi.com](http://www.ee-bi.com)

## Low-power IP Blocks for 5G Applications



imec presented two key building blocks for future 5G applications featuring record low power consumption. The first is a fast and extremely compact successive approximation analog-to-digital converter (SAR ADC), designed for consumer electronics, such as mobile phones, operating in the below-6GHz frequency bands (4G/5G). Secondly, imec developed a 60GHz front-end with radio frequency (RF) phase shifting and on-chip transmit-receive switching, targeting 5G fixed wireless access and small cell backhaul applications. These building blocks are available to interested companies by joining imec's industrial affiliation program, or through IP licensing. 5G mobile networks, promise massive connectivity through much higher data rates, lower latency and lower battery consumption than current 4G standards. To realize this, frequencies below 6GHz and also millimeter-wave frequencies, especially at the 57-66GHz unlicensed band, are explored, promising speeds of multi-Gb/s with low latency. Imec also developed a compact, energy efficient and low-cost radio front-end (TRX) that operates at 60GHz. The chip features 8-way calibration-free beamforming at RF frequencies to support a large number of antennas.

► Imec

► 53779 at [www.ee-bi.com](http://www.ee-bi.com)

November 2017

# PRODUCTS & SOLUTIONS



## Diffusion Pump Series with an Optimized Housing Design



The vacuum supplier Leybold has significantly reduced the energy consumption of the established DIP and newly developed DIJ diffusion pump series, with the aid of intelligent technologies and innovations. Leybold now provides a number of optimized models and accessories that are flexible and can be implemented worldwide into the relevant diffusion pump applications. The new DIJ family convinces with an optimized housing design, offering connections for both ANSI flange and ISO flange components as well as various electrical connection variants. The new five-stage nozzle system of the DIJ series has been especially improved for the pressure range from 10-2 to 10-3 mbar. Through design changes and modern control elements, the vacuum specialist was able to reduce the energy consumption of the diffusion pumps by an average of more than 30 percent - without sacrificing performance. In addition, there are further improvements in terms of serviceability and integration into the customers' systems. The lowering of the energy requirement has a positive effect in all areas of application.

### Leybold

► 53780 at [www.ee-bi.com](http://www.ee-bi.com)

## Power Transistor for L-Band Airport Surveillance Radar



Macom Technology Solutions announced the newest entry in its GaN-on-Si power transistor portfolio for pulsed L-Band radar systems targeted for airport surveillance radar (ASR) applications at 1.2 to 1.4 GHz. Delivering industry-leading efficiency at peak pulse power levels up to 500W, the new MAGX-101214-500 is expected to outperform premium-priced GaN-on-SiC-based transistors, and far exceed the performance, efficiency and power density of legacy LDMOS-based devices. MACOM's new MAGX-101214-500 enables customers to scale to higher power levels across a host of ASR applications, delivering 500W output power and greater than 70% power efficiency under pulsed conditions at 50V operation. Supplied in a small-footprint ceramic flanged package and supporting matching structures that minimize circuit size, MAGX-101214-500 transistors help to enable rugged, compact radar systems underpinned with efficient, simplified cooling and power supply architectures. The MAGX-101214-500 builds on the established success of MACOM's comprehensive portfolio of GaN-on-Si power transistors, which have demonstrated field-proven reliability in harsh environmental conditions. MACOM GaN-on-Si devices shipped: 1 million.

### Macom

► 53781 at [www.ee-bi.com](http://www.ee-bi.com)

## Electromechanical Linear Actuators with New Synchronization Capabilities



Thomson Industries has announced availability of new synchronization capabilities for its Electrak® HD heavy duty electro-mechanical linear actuators. Designers of equipment in which large or awkward loads must be moved repeatedly and evenly, such as large solar panels or heavy hoods on construction equipment, can now simultaneously distribute that load using up to four actuators. Thomson achieves its synchronization by embedding all load handling technology into a single electromechanical actuator, which is then wired in sequence with up to three other similarly equipped actuators. Designers install these wherever linear movement is needed without the need for external assemblies. Once the actuators are installed, customers synchronize them instantly by wiring them together and operating a single unit with a simple switch. During operation, system electronics detect speed changes that indicate load imbalances, thereby eliminating bouncing or other effects of imbalance. By using multiple actuators, synchronization increases system movement speed more efficiently. A larger load that might normally use a single, heavy load actuator, for example, could be moved faster by combining multiple, lower load actuators.

### Thomson Industries

► 53782 at [www.ee-bi.com](http://www.ee-bi.com)



# PRODUCTS & SOLUTIONS

## Mobile Vessels to Improve Process Efficiency

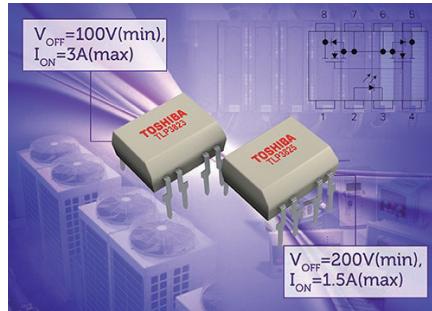


A mobile service offers a number of advantages where ready-filled filters are delivered to site with pre-fitted connectors, valves and pipework to allow them to be plumbed straight into the waste stream undergoing filtration treatment. When the filters are spent they can be exchanged using a dedicated vehicle that can deliver a replacement filter at the same time. The challenge presented to ThermTech was to design and manufacture a filter container that could be transported in the horizontal position and raised into the vertical operating position on site. ThermTech started the challenge by carrying out a detailed inspection of the transport vehicle and recording all the necessary measurements. This enabled the design of the new filter vessel to be created with a perfect match between the hydraulic loading arms and the heavy-duty location lugs on the vessel. This aspect of the design was essential to providing safe loading and unloading process that would provide many years of reliable service. Mobile process silos must be designed in such a way that improves both efficiency and safety.

► ThermTech

► 53784 at [www.ee-bi.com](http://www.ee-bi.com)

## Mid-voltage Photorelays in DIP8 Packages



Toshiba Electronics Europe launched two new mid-voltage, high current photorelays, the 100V TLP3823 with a 3A drive current, and the 200V TLP3825 with a 1.5A drive current. The new products will extend the range of large current photorelays to replace mechanical relays, alongside Toshiba's current 60V, 5A TLP3547. Toshiba is supporting and promoting the accelerated replacement of mechanical relays by applying its latest trench MOSFET structure, 8th generation UMOS, to realize output currents exceeding 1A. Unlike mechanical relays, photorelays have no physical contacts that incur wear and tear, contributing to significantly increased reliability. Photorelays are much smaller, thereby supporting the development of smaller and thinner products. The new photorelays will be used in diverse applications including industrial equipment, inverters, HVAC equipment, building automation and semiconductor and other test equipment. In almost all cases they will be replacing mechanical relays. Both devices offer an isolation voltage of 2500 Vrms and low values of on-resistance (TLP3823 60mΩ typ., TLP3825 250mΩ typ.) to ensure efficient operation.

► Toshiba Electronics Europe

► 53785 at [www.ee-bi.com](http://www.ee-bi.com)

## Desktop Power Adapter Complies to Latest Medical Standards



TRUMPower has released the new 120W TDM120 series of low cost medical grade AC/DC desktop power adapters to its product line-up. Using the power supply ensures compliance to the latest IEC/EN 60601-1-2 4th edition medical EMC standards. The TDM120 Class I units come with an IEC 320/C14 or IEC 320/C6 AC inlet and class II units are furnished with an IEC 320/C18 or IEC 320/C8 AC inlet. The power adapters are available with 12V, 15V, 18V, 19V, 20V, 24V or 48V outputs, making them suitable for a wide range of applications. Standard output plug for the 12V and 15V models is a 4 pin DIN. The 18V-48V models are equipped with a 2.5 x 5.5 x 9.5mm barrel connector as the standard. TRUMPower offers additional connector and cable options upon request. The TDM120 series is approved by UL/cUL and TUV to the latest medical standards, including IEC/EN/UL 60601-1 Edition 3.1, ANSI/AAMI ES 60601-1: 2012, CSA-C22.2 No. 60601-1: 2014. The power adapter complies with IEC/EN 60601-1-2 4th edition medical EMC and immunity standards including EN 55011/FCC/CISPR 11 class B (conducted and radiated emissions), EN 61000-3-2 and others.

► TRUMPowers

► 53786 at [www.ee-bi.com](http://www.ee-bi.com)



# PRODUCTS & SOLUTIONS



## Magnetocaloric Cooling System with Optimization of Material Properties

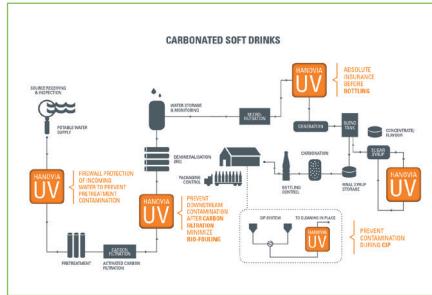


Vacuumschmelze has developed the solid-state refrigerant Calorivac® which is in small-scale production, and tested in many magnetic cooling prototypes around the world. Future fields of application are industrial cooling systems, air conditioning in vehicles or buildings, as well as refrigerators in supermarkets. The future of magnetic cooling depends to a large extent on strong networks working towards a common goal. Very recently, VAC together with the Fraunhofer Institute for Physical Measurements Techniques (IPM) and the companies Philipp Kirsch GmbH and GSI Technology UG, started a 2.4 Mio. Euro project funded by the Federal Ministry for Economic Affairs and Energy (BMWi). VAC will contribute to the project with the optimization of CALORIVAC® to be compatible with the new heat-transfer concept. This includes the optimization of the material properties and its shaping and the development of measurement techniques for the characterization of materials. VAC is committed to environmentally friendly and efficient technologies in all areas of life. With MagMed, VAC continues its commitment of innovation towards the commercialization of magnetocaloric cooling technologies.

### Vacuumschmelze

► 53787 at [www.ee-bi.com](http://www.ee-bi.com)

## UV Disinfection Solutions for Water Treatment

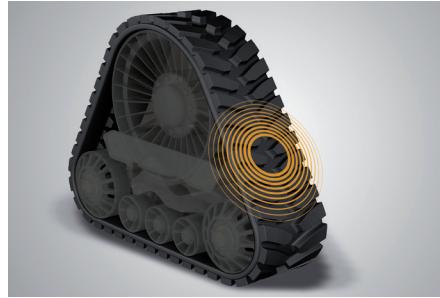


Hanovia recently showed its range of ultraviolet (UV) disinfection and water treatment solutions. Helping those aiming to enhance their biosecurity, Hanovia provided advice on the use of UV systems to ensure water quality within food and beverage applications. Hanovia also presented its PureLine Ultraviolet Energy Optimised (UVEO) water treatment system, which has been designed specifically for applications within the food and beverage industry. The PureLine UVEO is suitable for high flow rates just using a single medium pressure lamp, which is designed to consume less power than conventional UV systems. The system takes advantage of an optimised hydraulic design to deliver a guaranteed, consistent UV dose with reduced energy and running costs. Hanovia UV systems provide non-chemical disinfection for process, product water and sugar syrups in a wide range of food and beverage applications. With the Hanovia PureLine UVEO, a dedicated solution for the food and beverage industry, the company is able to support the industry's demand for greater energy-efficiency and lower operating costs. The intelligent control is capable of monitoring flow and UVT readings.

### Hanovia

► 53788 at [www.ee-bi.com](http://www.ee-bi.com)

## Sensor Technology to Reduce Wear of Rubber Tracks



Rubber tracks with sensor technology are among Continental's latest technologies. This technology allows the carcass temperature of the rubber tracks to be measured and monitored during use on vehicles. The sensors are fitted within the carcass of the tracks. Temperature readings are relayed to the driver of the tractor or combine via an in-cab screen. An alert is triggered if the temperature exceeds a certain threshold. Targeted monitoring of this kind helps operators of agricultural vehicles to extend the service life and efficiency of these components and helps avoid repair costs. If something becomes critical, the driver receives a corresponding warning on a display in the driver's cab. This is particularly beneficial when traveling on asphalt roads, as the rubber tracks are particularly susceptible to wear on this surface. With the intelligent rubber tracks, drivers always have an overview of the temperature and can tailor their speed as effectively as possible. This allows them to get a longer service life out of the rubber tracks without having to reduce their speed. Another advantage is that preventive maintenance ensures that action can be taken before a defect actually occurs.

### ContiTech

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