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AKKODiS

Thinkers & Makers

A Smart Industry tech magazine, sharing insights and stories from the people that make incredible happen through their ideas & their actions.

Curiosity is the Building Block of Quantum Computing's Evolution

Rethinking Aviation:
Towards a Net Zero Future

Taking Car Batteries to the Next Level

How Data Can Help Feed the World

AKKODIS

Make Incredible Happen

Welcome To Thinkers & Makers, The Smart Industry Tech Magazine

Thinkers & Makers is an inclusive concept that humanizes the approach to engineering and technology. It encompasses the breadth of our people and how we identify and solve problems at Akkodis. We are Thinkers who stretch outside their comfort zones to drive innovation, and Makers who team up with clients and partners to turn those innovations into tangible solutions. Together, we enable a smarter, more sustainable tomorrow. This is the 'Smart' in Smart Industry...and it will be brought to life over and over again in this, and every issue of Thinkers & Makers magazine.

Editorial

“Tech for ‘Good’

Jan Gupta
President Akkodis

Welcome to our latest issue of Thinkers & Makers – the Smart Industry tech magazine brought to you by Akkodis.

Sustainable Development Goals, Technology & Smart Industry

All the world's major industries are challenged to decarbonize, improve diversity, equity and inclusion (DE&I) and deliver upon the promise of a more sustainable tomorrow. As time goes by, these challenges are multiplying and intensifying, but as stated in the latest version of the UN's 2023 Global Sustainable Development Report, 'Transformations are possible, and inevitable.'

These transformations cannot come about without technology.

Digitalization and purposeful innovation are transforming the Smart Industry, improving business performance and competitiveness – and simultaneously, delivering a positive impact on the planet and society.

In this issue, you'll read about how tech is being put to work to help feed an increasing global population more sustainably, despite less favorable growing conditions brought about by climate change.

You'll learn about how it is making great strides in sustainable transportation – moving the boating sector one step closer to widespread electrification by applying automotive industry wire harness expertise, propelling the aviation sector toward net-zero emissions with innovative aircraft design and hydrogen power, and democratizing access to electric vehicle battery performance information through AI-driven manufacturer-agnostic solutions.

You'll also learn how technology is delivering the decentralized energy grid of the future today, by empowering prosumers with home storage solutions, and renewable energy market trading applications.

You'll see, through tangible examples, how game-changing technologies like quantum computing, AI and blockchain are poised to have revolutionary impacts across the board on the sustainability and efficiency of our manufacturing processes and online exchanges – reducing time, making accurate predictions, and further connecting physical and digital worlds.

We Are All Connected

As you dive into the pages that follow, not only will you read about cool new tech and how it's being applied to make the world a better place, you'll also meet a variety of Akkodis' tech experts – our Thinkers & Makers. They'll illustrate, through their knowledge and passion, the positive and substantial impact technology has on how industries operate – from small companies to entire markets – and how society functions.

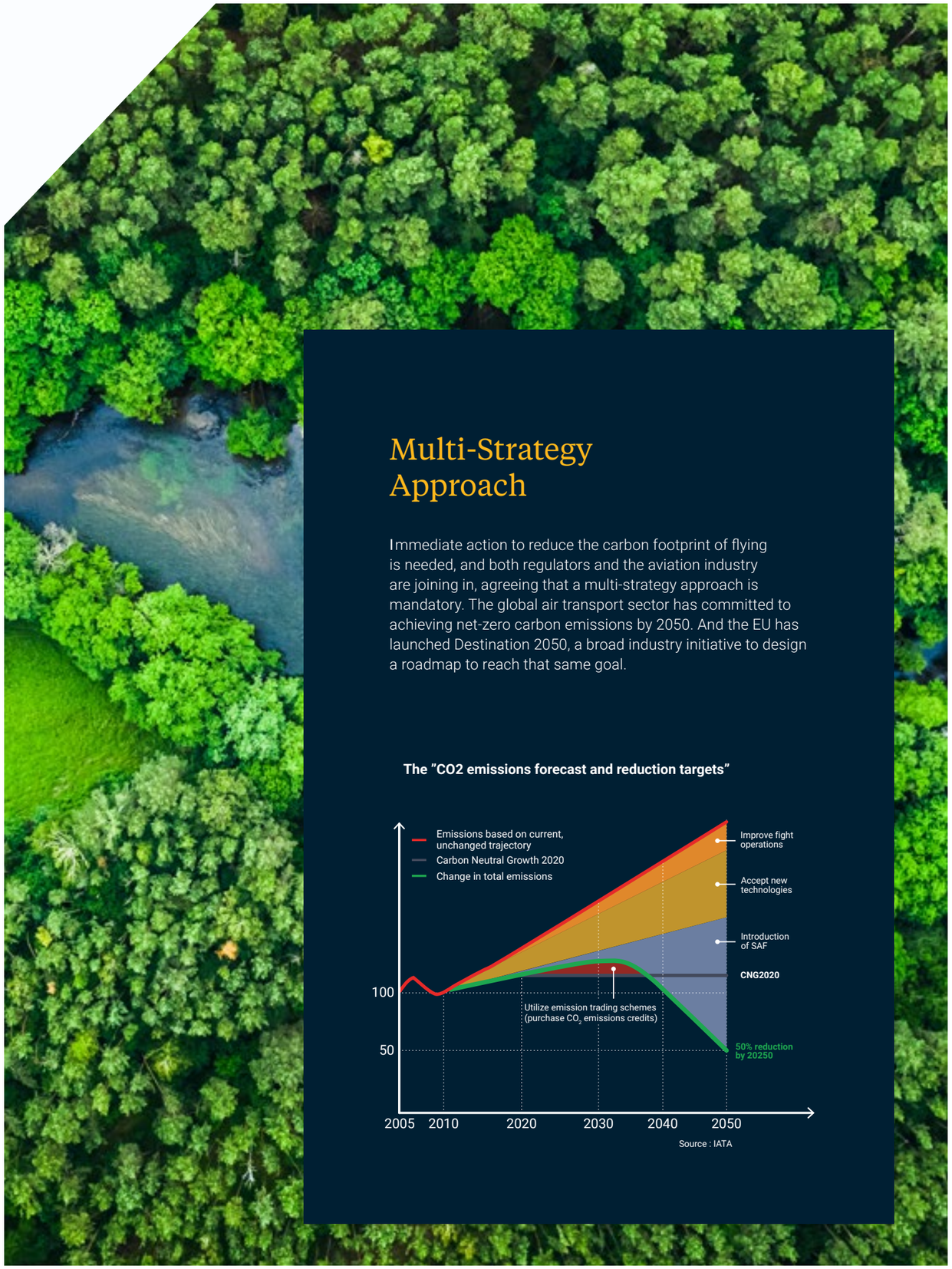
The Smart Industry transformation must be a sustainable transformation. Managed responsibly, Smart Industry is a change agent for bridging the digital divide toward a more equitable and inclusive world. Our approach to technology, like our approach to the Sustainable Development Goals, must be integrated – recognizing that our action or development in one area affects outcomes in others. This is how we can use tech for 'Good.'

> As I've said before, incredible things can happen when minds meet, and sleeves get rolled up. I hope you enjoy this edition of Thinkers & Makers and together, let's get inspired by what's possible!

Rethinking Aviation:

Towards a Net Zero Future

Aviation is recovering strongly from its biggest ever crisis, the COVID-19 pandemic. But with impressive growth rates comes a huge and growing climate impact. In 2021 aviation accounted for over 2% of global energy-related CO_2 emissions, having grown faster in recent decades than road, rail or shipping. Aviation emissions will continue to grow rapidly in the decades to come, as the number of global air passengers is expected to double over the next 20 years.



Multi-Strategy Approach

Immediate action to reduce the carbon footprint of flying is needed, and both regulators and the aviation industry are joining in, agreeing that a multi-strategy approach is mandatory. The global air transport sector has committed to achieving net-zero carbon emissions by 2050. And the EU has launched Destination 2050, a broad industry initiative to design a roadmap to reach that same goal.

The "CO2 emissions forecast and reduction targets"

Source : IATA

Improvements within design and manufacturing, fuel-efficiency, air traffic management and economic measures will all have their role to play. From new ways to design airframes and the development of new composite materials to more sustainable manufacturing methods, the whole process of building new aircraft is getting an overhaul. In manufacturing, Smart Industry concepts such as digital twins, quality prediction and control based on artificial intelligence (AI), robotics and the Internet of Things (IoT) are being developed and implemented.

When it comes to energy, new propulsion systems with lower fuel consumption are on their way. And new types of fuel are already making a difference: Sustainable Aviation Fuel, (SAF), made from bio resources, can be blended with conventional fuel to reduce emissions. Consequently, scaling of SAF production is a hot topic in the aviation industry. Further ahead, hydrogen-powered aircraft, hybrid-electric and fully electric propulsion technologies are on the horizon, although the significant extra weight that comes with incorporating batteries means that only short-range flights are feasible for the foreseeable future.

Making air traffic operations smarter can also lead to carbon reduction, through improved flight planning, weight reduction and the promotion of energy-efficiency in airports.

Finally, economic mechanisms such as emissions trading and offsetting schemes are needed to rapidly reduce the sector's carbon footprint.

Making air traffic operations smarter can also lead to carbon reduction, through improved flight planning, weight reduction and the promotion of energy-efficiency in airports.

Green&Fly

As a tech frontrunner within aviation, Akkodis is deeply committed to the green shift, and in 2021 Akkodis revealed a zero-emission concept for regional flights, named Green&Fly.

The 100% electric hydrogen-powered Green&Fly concept aircraft demonstrates a strong commitment to scaling up renewable energy and contributing to the decarbonization of the aviation industry, through technology and innovation.The aircraft is based around a rhombohedral wing shape and designed to carry up to 30 passengers, with a range of 500km. Green&Fly is a zero-emission concept for a regional transport alternative, which aims to enhance mobility in mid-sized cities where there are no large hubs. Able to cope with runways of any length, the Short Takeoff and Landing (STOL) Green&Fly can operate on existing networks of aerodromes, making use of underused infrastructures.

The concept combines the latest technologies and explores various configurations to optimize the aerodynamic performance and energy consumption of the aircraft, as well as its electrification potential. Green&Fly is a light and small aircraft (classification CS25) with a futuristic design and a sophisticated mechanism powered by hydrogen fuel cell batteries and supercapacitors.

The rhombohedral wing shape, compared to a classic wing shape, generates less turbulence at wing extremity allowing a significant reduction in drag, opening up new possibilities for a highly efficient propulsion system. The stiffening of its structures is inspired by biomimicry based on the growth process of a leaf's veins to improve stiffening efficiency, reducing the mass of the aircraft. To maximize the utilization rate, the cabin design is flexible allowing the aircraft to be easily converted from passenger to freighter.

The cockpit integrates digital applications and AI to facilitate single-pilot operations. The aircraft design also incorporates energy recovery landing gear, with electric extension/retraction, with the aim of steadily replacing all hydraulic components with electric ones to reduce emissions.

The Green&Fly concept is meant to inspire the industry, as well as serve as a challenge to Akkodis' own engineers to radically rethink personal air transport. And they've risen to the challenge, presenting a truly disruptive design.

Innovation initiatives such as Green&Fly serve not only as an inspiration to the industry and to Akkodis' own tech experts but also emphasize that the aerospace industry is a talent destination. That is an important message, as the race to attract, retain and develop tech talent is intensifying both within and beyond the aerospace sector. Advanced engineering and digital skills are in high demand. At the same time, turnover in the sector is high, and an aging workforce contributes to the shortage of skilled workers.

Akkodis wants to play a major role in addressing these challenges, by encouraging a culture of innovation and building digital skills, internally and externally. Green&Fly is an important building block in shaping the aerospace industry of the future.

The rhombohedral wing shape, compared to a classic wing shape, generates less turbulence at wing extremity allowing a significant reduction in drag, opening up new possibilities for a highly efficient propulsion system.

Green&Fly

Sustainable Concept Aircraft

Hydrogen

Hydrogen is the main power source for the aircraft's fuel cells, with back-up batteries and an ultra-capacitor for optimized distribution.

Energy Management System

The Green&Fly EMS monitors the different energy sources available (fuel cell, battery and supercapacitor). These sources are different in their dynamic behavior but are complementary, making it possible to respond optimally to the energy needs of the system in real time.

Energy recovery Landing Gear

The aircraft design also incorporates energy recovery landing gear, featuring electric extension/retraction, with the aim of progressively replacing all hydraulic components with electric ones to reduce emissions.

New Shapes

The rhombohedral wing shape, compared to a classic wing shape, generates less turbulence at wing extremity allowing a significant reduction in drag. It also enlarges the wing surface area, opening up new possibilities for a significant increase in drag-to-lift ratio.

Flexible Cabin

To maximize the utilization rate, the cabin design is flexible, allowing the aircraft to easily be converted from Passenger to Freighter.

Next-Gen Cockpit

The cockpit integrates digital applications and AI to facilitate single-pilot operations.

Novel Materials

The stiffening of its structures is driven by an algorithm developed by Akkodis. Inspired by biomimicry, the structure design is based on the growth process of a leaf's veins to improve stiffening efficiency, thus, reducing the mass of the aircraft.

Democratization & Decentralization

Co-creating the Smart Energy Grid of the Future

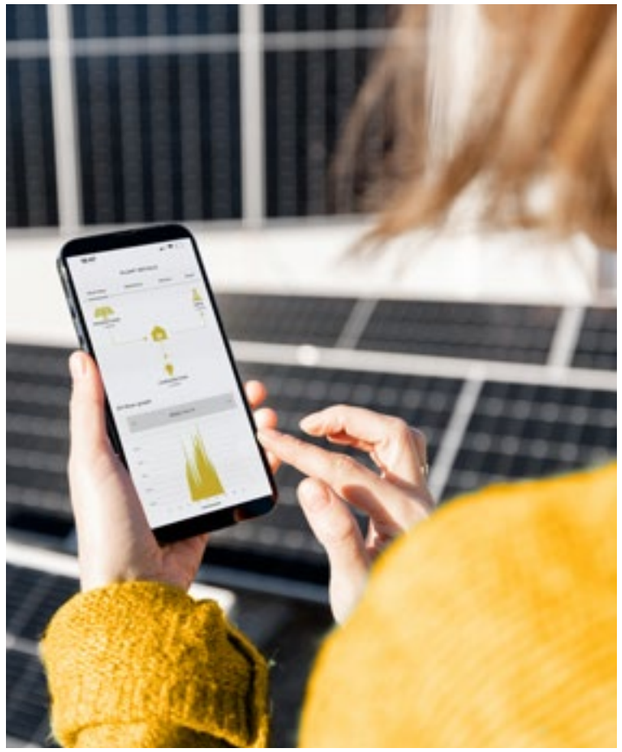
The fight to reduce global warming is profoundly affecting societies, businesses and individuals everywhere. Environmentally conscious individuals want to contribute to the transition to a low carbon economy. Digital tools and solutions allow them to practice what they preach.

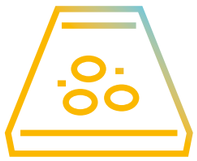
Think Global Act Local

In the power sector, growing consumer engagement and activism is changing the business, compelling energy producers and providers to offer new levels of service and transparency.

Passive consumers are increasingly being replaced by activists and prosumers–consumers who get involved in the creation of products–as more and more people engage at a grassroots level to help the planet.

Customers want to control their energy use, and they want to know where their electricity comes from. They want guidance on how they as individuals can contribute to decarbonization, by buying renewable energy and using it more responsibly.





Smart and Decentralized

To meet these new customer demands, energy companies are evolving from suppliers to advisors, offering their customers real-time data on consumption and cost by developing smart meters, flexible billing systems and smartphone apps.

The trend towards empowering consumers would be unthinkable without digitalization–digital tools make the move from consumer to prosumer possible.

This democratization goes hand in hand with the decentralization of our energy system. Future energy systems will be radically different. We're moving away from a small number of large, conventional power plants feeding a centralized distribution system, toward a Smart Grid, integrating renewable energy sources into the power supply, decentralizing energy production and storage and with built-in flexibility and intelligence.

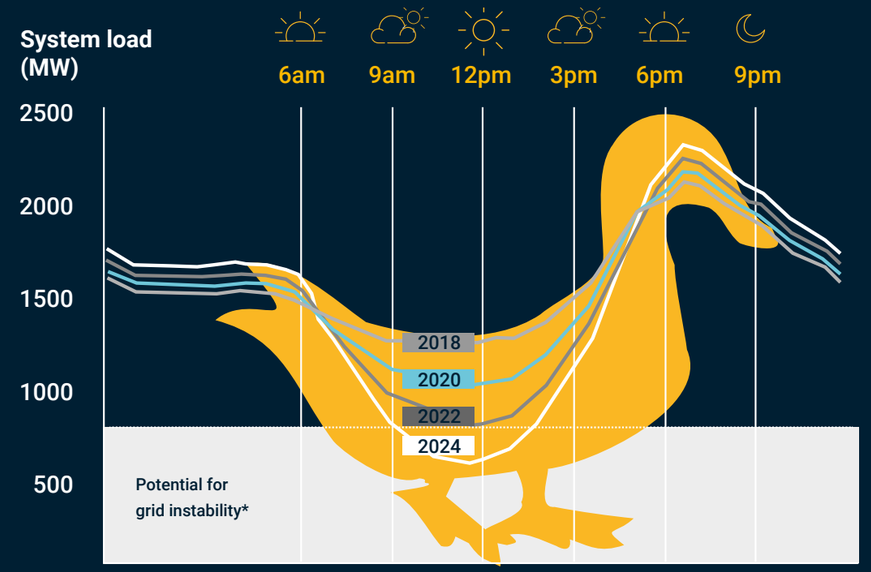
Handling the Duck Curve

While conventional, centralized energy production and distribution is fairly easy to control to cater to shifting demand patterns during the day, renewable energy is harder to handle. Solar energy typically peaks in the middle of the day, while energy demand increases around sunset, peaking in the mid-evening hours. Translated to a graph this timing imbalance produces a Duck Curve, resembling the silhouette of a duck.

The Duck Curve is just one of many challenges facing the engineers building the Smart Grid of the future as the centralized grid is gradually replaced by a highly distributed system for energy production, storage, and consumption.

Energy will come from a wealth of different sources of different sizes, from massive offshore wind farms to the solar panels on the roof of a house. All of these sources feed into the energy grid.

To handle the mismatch between production and demand, energy must be stored for later use. And just as energy will come from many different sources, there will be many forms of storage, some centralized and high capacity, some small and decentralized.



CA graphical representation of the 'Duck Curve' for the SWIS (South West Interconnected System), created with 2020 data from the Australian Energy Market Operator.

Source: https://www.synergy.net.au/Blog/2021/10/Everything-you-need-to-know-about-the-Duck-Curve

Decentralized and Diverse

Distributed Energy Resources (DER), or energy-related technologies such as electric vehicles, battery storage, solar energy systems, smart thermostats, heat pumps and much more are connected to the distribution grid, making for significant challenges for power retailers and distribution system operators.

Not only do they need to integrate DERs into existing grid operations but they also need to control them under virtual power plant (VPP) or demand response (DR) programs.

The DER trend is also disrupting existing business models and traditional product offerings, compelling distribution companies and power retailers to become more agile, redefine their customer value propositions, and run multiple operating and revenue models simultaneously.

Changing Consumption

The push toward electricification, including innovations such as electric vehicles and heat pumps, is changing demand patterns. While previously, consumers simply passively paid for their energy use, they are now starting to participate in the system to reduce their carbon footprint, feeding the energy they produce into the grid or receiving energy and storing it temporarily in the battery powering their home or their car.

The Smart Grid would be unthinkable without digital communications technology. Like the internet, it consists of computers, cables, controls, and automation.

This new communication infrastructure layered on top of the electricity infrastructure enables two-way communication between the utility and its customers and quick and efficient responses to changing electric demand. Digital tools make the grid flexible and robust enough to cope with fluctuations in consumption as well as production over hours, days, and weeks.

> The Smart Grid would be unthinkable without digital communcications technology.

The Backbone of the Green Shift

The new democratic and decentralized Energy Internet will be the backbone of the transition to a low carbon economy. Engineers and software developers will be indispensable in developing its building blocks, whether vehicle charging solutions, biofuels, dynamic energy billing or near real-time control systems monitoring supply and demand. Engineers and software developers will come up with the digital solutions that not only help energy companies cope with the increasing penetration of DER but also extract value from them.

Get in touch with our
Energy & Clean Technology Experts

Akkodis has developed a demonstrator platform for digital exchanges between energy system market participants for the EU-SysFlex demonstration program.

The platform leverages Estfeed2 secure data exchange infrastructure based on the open-source X-Road project, the backbone of e-Estonia blockchain-based government services. Akkodis' data analytics platform was utilized to provide near real-time visibility, forecasting and simulation of energy system operations.

SysFlex is a program in which a consortium of governments, energy companies, and digital and engineering experts have trialed system operation and flexibility solutions for integrating 50% renewables into the pan-European Power System by 2030. The objective of the demonstrator platform was to facilitate quick and safe operation in an increasingly decentralized energy system, with numerous market participants and regulators, and a need to manage data in very close to real-time.

Akkodis is assisting one of the leading European developers of state-of-the-art, smart, and connected energy storage solutions.

Leipzig-based SENEC manufactures energy systems for homeowners, integrating solar panels, power storage and vehicle charging into one solution.

The centerpiece of the SENEC portfolio is the SENEC.Home energy storage box. The newest version, SENEC.Home 4, can store up to 25.2 kWh. But a battery is not just a battery, and it's not only defined by its storage capacity. To deliver value to the customer it must work with other systems and infrastructures, such as billing software, installing and maintenance systems, backends, databases and much more..

Since 2019, Akkodis has developed a large part of the necessary software. Ensuring scalability is probably the most crucial contribution IT Sonix has brought to the table in its cooperation with SENEC. SENEC has grown to 500 employees in just three years, and the company is expanding into Italy and Australia.

In Australia, Akkodis has been working with a leading energy generator and retailer to build E-Flex, an intelligent Distributed Energy Resources Management solution that reduces exposure to the negative pricing on the balancing market.

With one of the world's largest penetration rates of solar rooftop installations, fast deployment of intermittent renewables, and five-minute settlements, Australia is a challenging market when it comes to power price volatility. Negative prices have become a common phenomenon, and the number of hours with negative power prices has increased steadily in the last few years, threatening the profitability of energy companies.

By leveraging energy usage data and energy wholesale market pricing data, the E-Flex analytics model developed by Akkodis on Microsoft Azure uses advanced machine learning to predict negative pricing events for customers' solar power generation. Based on the predicted threshold, it automatically applies its intelligent DER control to switch off customers' solar energy units during the negative pricing window to curb losses.

Extending the Life of Aging Java-Based Embedded Devices

The steady increase in computing power is, strangely enough, one of the dilemmas of the electronics industry. More power means better and more capable products, but the advent of the latest generation of hardware also means pressure to replace installed “last generation” products. That translates into a shorter lifetime for the installed base. Just look at consumer electronics – mobile phones die young.

The industry's ability to develop new devices with ever more advanced features creates strong customer demand, reducing product lifetime significantly. But while the increase in computing power is an industry driver in consumer electronics, other industries are struggling to keep up.

In other sectors, devices are expected to have a much longer lifetime. In the rail industry, equipment and infrastructure can be in service for 30 years or longer. It's just too expensive to replace the systems with newer versions every five years or so. Instead, system operators are looking for ways to extend the lifetime of the installed hardware and still enable new functionality.

This is where Akkodis comes in.

8/16/32/64

It's all about numbers. The evolution of microchips is counted in bits, from 8 to 16 to 32 to 64, corresponding to internal data representation and address-space, as well as overall performance. As computers become more complicated, the size of their memory increases and with it the number of bits used to address it. From the 1990s onwards a 32-bit CPU architecture was dominant. But around 2005 the evolution of laptops, servers and mobile phones demanded a move to 64-bit CPUs.

However, while the world has moved to 64-bit, many industrial devices born in the 32-bit era remain in service. To continue to function, hopefully for a long time to come, they require maintenance and security updates, maybe even new features. This is becoming increasingly difficult in a 64-bit world.

How can you fix the 32-bit problem?

New Lease on Life

Akkodis offers an answer to that question.

Akkodis' Virtual Machine Technologies Lead in Germany, Bruno Caballero, and his team have developed a way to turbocharge older 32-bit devices, giving them a new lease on life. They offer Java developers a new way to update these devices and even build new features for them without additional memory or computing power. Developers can now use the newest Java versions, instead of having to work with older Java versions rooted in the 32-bit era.

The solution builds on Akkodis' extensive Java expertise and its work with the Graal Virtual Machine, which was initially developed by Oracle to be used on servers. Akkodis has tweaked GraalVM to fit the embedded space as well, curing many of the well-known headaches caused by traditional Java virtual machines in that domain. Now Caballero and his team have extended it even further to support 32-bit powered devices.

> "While most of the electronics industry is focusing only on 64-bit technology, we are also targeting the devices still running on 32-bit CPUs.

Replacing devices running on production lines or on trains and rail tracks is expensive, so they need to stay in service as long as possible. However, they need to be serviced continually to address security issues and to update them with new features. "This is where we come in," Caballero said. "Instead of installing new devices, customers can come to us. Using our software, they can add five or ten years to the lifetime of their existing devices. Obviously, it saves money, but not only that. Increasing device lifetime contributes to the overall sustainability of their operations."

Saving up to 50% Memory

How is it done? Well, instead of using a conventional runtime to run programs written in Java, the Akkodis solution uses GraalVM. This saves 30-50% memory, depending on the application. In this way the memory of a 32-bit CPU, which is relatively limited compared to a 64-bit system, can cope with new features, integrate with new third party software, and handle security updates.

Besides saving memory, the software also improves startup time significantly.

Using GraalVM, customers can continue to develop new features for these older devices. Developers can use the new versions of the Java programming language, instead of having to use an old Java version for 32-bit CPUs. "That means developers have access to new and cool Java features, instead of being stuck in an older Java version. Developers no longer have to write software like they did ten years ago. They can use the newest Java features, even for the old 32-bit platform," Caballero said.

In their effort to build a bridge between the "old iron" and the newest Java programming features, Caballero and his team are targeting the two dominant 32-bit platforms. They have already covered ARM 32, which is the most common 32-bit platform, and soon they'll begin adapting their work to Intel's 32-bit platform as well.

Electronic Railway Control System

A large Akkodis customer has ordered a platform port for one of its embedded products on 32-bit x86 hardware. The company specializes in control and automation solutions for the railway sector. Its traffic control systems manage train traffic, with vast numbers of sensors monitoring tracks, catenary systems, switches, traffic lights and much more. Electronic railway control systems are hugely complex, not least as strong redundancy is required for safety reasons. In many places, several devices monitor the same component, to reduce the risk of failure. Therefore, it's vital to be able to extend their lifetime, guarantee device security, and continually update them.

There is a huge number of aging devices out there that need to be revitalized, across all kinds of industries, said Caballero.

"We have developed a unique solution to do just that, and we are looking forward to helping companies to keep their aging devices in tip-top shape for as long as possible. Not only can we keep these devices alive, we can improve them by turbocharging their memory, while giving Java developers optimal working conditions by allowing them to update them with the newest Java tools."

Curiosity is the Building Block of Quantum Computing's Evolution

Cutting-Edge Technology Inspires Transformation

We are on the precipice of solving some of society's most complex problems, and when it comes to quantum computing, curiosity holds the key to unlocking powerful capabilities.

“What’s really interesting is how we can use the ability inside the framework of quantum mechanics in order to make complex things look much simpler and more achievable.

Hossein Afsharnia
Akkodis Research and Development Engineer

Powerful Quantum Advantage

By harnessing the phenomena of quantum physics, quantum computing is currently revolutionizing how data is being processed. It uses individual atomic or atomic-like particles, known as qubits, as the basic building blocks to hold information.

“What’s really interesting is how we can use the ability inside the framework of quantum mechanics in order to make complex things look much simpler and more achievable,” said Hossein Afsharnia, Akkodis Research and Development Engineer.

For some tasks, the efficiency gain of using quantum computing can be exponential: it would require exponentially more resources to implement and execute the exact computation on a regular computer of today. Quantum computers may enable us to run complex calculations with unparalleled efficiency and solve some of the most challenging problems of our time.

“For me, it feels like a miracle that mankind is able to build such hardware.” said Andreas Schruba, Akkodis Quantum Technology Product Manager.

We are already seeing quantum computing at work in our society. Asset-management firms are utilizing it to increase foreign-exchange profits. A global automaker partnered with quantum experts to reduce the time it takes to design a vehicle, test the aerodynamics and predict how its materials will perform under stress. Work is also under way to develop algorithms that will eventually help with supply chain management and optimization – which would help companies quickly react when supply chain problems arise.

Evolution of Quantum Computing

Interest in quantum computing is rapidly growing and evolving every day. With increasing access to such platforms, people are also more interested in exploring possible applications.

However, there is still much work to be done. Qubits are fragile and prone to errors. By their nature, they are difficult to control. If their errors are not corrected, a quantum computer will produce results that just don't make sense. Experts are working to develop algorithms to overcome and correct qubit problems so that quantum systems can reliably scale and be more fault tolerant.

The future of quantum computing is about how inventive users will be in identifying exceptional applications for today's hardware. Quantum computing can be used to speed up some of the calculations of an already existing problem; the rapidity of the applications makes those problems solvable. More so, use cases will emerge that were not immediately on our minds. From these new applications, new businesses will emerge that particularly benefit from the unique strengths of quantum computing. Akkodis experts predict these new use cases will emerge not in ten years, but maybe three to five.

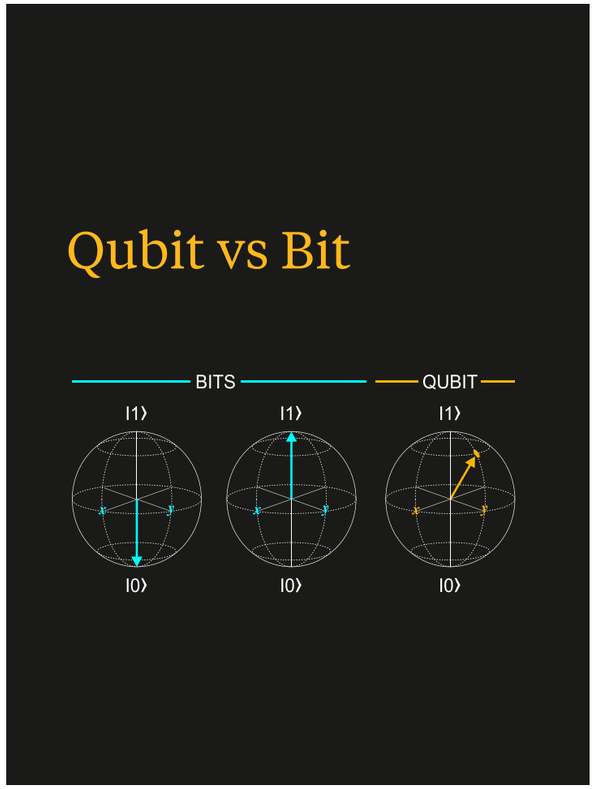
"I think the most successful companies in the next few years will be those which are the most inventive or the most explorative in thought. They will discover new applications which may excel their existing businesses on particular aspects they may not have thought of in the beginning of their journey," said Schruba.

Curiosity is the Key to the Evolution of Quantum Computing

To fully harness quantum computing's capabilities, we must begin by piquing interest and cultivating curiosity. Physics, as a starting place, helps foster early exploration in the field while providing the opportunities to be prepared for a variety of industries. When learners gain insight into how quantum computing operates and its uses, there will be a much higher probability that solutions, currently not in our environments, will be created.

For many in the field, this means helping our youngest generations develop expertise and interest around the technology. The focus right now should be about showcasing smaller applications and realistic use cases for hardware. Then by helping new explorers uncover what the applications could be in the future, we'll start to see an explosion of curiosity. And with curiosity comes innovation.

"I think these people who are curious, and explorers, can link the knowledge from a specific field to quantum computers; these will be the successful users of this application," said Schruba.



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Andreas Schruba
Akkodis Quantum Technology Product Manager

> Working with so many people from different fields, different technologies, something like 50 error-corrected qubits within ten years is achievable. It will be tough, but can be done.

Stefan Ulm
Akkodis Senior Project Manager

Bold Predictions

When considering the variety of hardware and large community in the field, within five to ten years we will see error-corrected qubits – which is a significant step in building large-scale quantum computers to solve problems. Remember, without having quantum error correction in place, algorithms have to be short to obtain correct results.

"Working with so many people from different fields, different technologies, something like 50 error-corrected qubits within ten years is achievable. It will be tough, but can be done," said Stefan Ulm, Senior Project Manager at Akkodis.

Akkodis experts hypothesize that if quantum computers achieve zero-error possibilities, information that exists about every atom of the universe can be decoded into a quantum computer that has only 400 working qubits. Right now, it's very far from being achieved because the errors don't allow for zero-error qubits.

Additionally, the role of engineers will be critical to maintaining quantum computing systems moving forward. The convergence of digital and engineering means a fast-changing future for tech workers as old expertise becomes obsolete and demand for new expertise grows.

There is widespread uncertainty surrounding how artificial intelligence will impact future quantum computing capabilities and the market overall. However, Hossein believes that we have not yet achieved any sequential way of thought in AI or any kind of processing of information that exists.

"The way humans can think in a sequential way cannot be substituted by any machine of any power at the moment," said Hossein. "No job will be substituted fully by any machine. This is my opinion. Maybe we will see another development in the future."

Harnessing the Broader Ecosystem for Transformation

The success and transformation of quantum computing relies on a broader ecosystem of experts who can work together and achieve one goal. Akkodis is using its wide-reaching quantum computing expertise to help different fields of industries uncover their challenges and offer solutions to how those roadblocks might best be overcome. The in-depth knowledge of Akkodis experts links the interest and needs of industry clients to available hardware and to the development of new algorithms and applications.

In 2017, Akkodis began with the first small tasks in this space, building control electronics for ion-based quantum computing and developing critical connections and partnerships worldwide. Through several collaborations, Akkodis has partnered with groups building the quantum computers, developing algorithms, and providing first industry use cases.

With the evolution of quantum computing, Akkodis is among the first to partner with organizations to build their quantum computers so they're capable of solving bigger problems. These challenges are now easier to be mapped to real-life problems such that the gap between what's possible on the machine and what's useful for business is becoming smaller.

"We are among the first which are experiencing and participating in how real-life problems are executed on such hardware," said Schruba. "I think this gives us a very valuable head start in understanding what one has to do to present a problem to these hardware and extract answers from them."

So, what's next? Akkodis experts will continue to harness their curiosity, while inspiring young thinkers in the next generations to become trailblazers in quantum computing. The technology is transformative, and Akkodis is thrilled to be a part of changing the world.

How Data Can Help Feed the World

The world's agricultural sector faces a big challenge: How to feed a growing global population while climate change is making the conditions for cultivating crops less favorable, with escalating droughts, heatwaves and floods – and how to do that sustainably.

> The overall mission is sustainability. Agriculture is still very archaic when it comes to the tech that is used. It is about finding out how to use machine learning and AI to make that data more available to the regular farmer.

Data can help. Akkodis has partnered with a major client to bring better data analysis to the agricultural sector, using a combination of artificial intelligence (AI), machine learning, sensors, Internet of Things (IoT) technology and robotics to create an integrated agriculture data platform that can provide insights into how crops grow and help farmers achieve better harvests.

That's a vital challenge at a time when rising temperatures caused by climate change are negatively affecting crop yields around the world – and when global agriculture will need to produce more food in the next 50 years than it has in the previous 10,000 in order to sustain the growing world population.

Sustainability Mission

"The overall mission is sustainability," said Anthony Nguyen, Technical Delivery Manager at Akkodis. "Agriculture is still very archaic when it comes to the tech that is used. It is about finding out how to use machine learning and AI to make that data more available to the regular farmer."

Bringing together different datasets on one platform can give famers vital information. Analyzing images of pests on crops can help them decide when to apply pesticides and which ones to use. Information on the size of leaves on plants in the field can help farmers adjust the start date for harvesting, improving the quality of their yields.

"The quality of farming is important. Given the climate situation, it can help to understand how much their yields are going to be and what they can do to improve the yield," said Nguyen.

As technology partner, Akkodis has been responsible for helping the client with the development, design and support of the machines specially designed to collect the data. Akkodis also simplified the ways data is collected, as well as managing the entire data collection operation on the ground.

"It's a large, scalable operation across various fields and various scenarios," said Kishore Raj, Vice President & Partner: Technology and Engineering Consulting and Services at Akkodis.

An important part of the project is the development of high-tech prototype rovers which trundle through fields, taking high-quality images of the crops. These are then combined with other data sources such as weather or soil information and satellite imagery. By bringing together several datasets, the client team is able to build a more complete picture of how the crops grow, using machine learning to spot patterns.

> Data is really critical. There's a large scale of data collection to be done to build the analytical capability and the artificial intelligence capability around it.

Designing machines that can work efficiently on sometimes inaccessible farmland and collecting data from different sized crops without damaging them is no easy task. The rovers are now in use in hundreds of farms across North America and next steps will include rolling them out to other regions too. The bigger the scale of the project, the more data can be collected and the greater the accuracy of the findings, explained Nguyen.

Building Up the Knowledge Base

The project makes use of Internet of Things technology. “To be more real-time it does a lot of data processing within the machine itself, comparing it with the database in the cloud,” said Kishore. “We’re constantly building a lot of knowledge.”

Achieving scale was a key reason behind entrusting the data collection part of the project to Akkodis. “Our client was a small start-up working at a high velocity. They didn’t have that scale and wanted to bring in a supplier that could help them scale up,” said Nguyen.

Akkodis’ collaboration with the client began with just a few experts working on the project, but more than 20 people are now working on it in high season and the client team expects help on the technology side with development and process improvements.

In addition to giving farmers the tools to improve yields, the platform can help improve the quality assessment process as governments tighten certification standards for some food products.

A particular focus at the moment is berries. The technology platform allows growers to scan and classify their berries even while they are still growing. That gives them the chance to intervene with more water, shade or pesticides to improve the crop.

Being able to supply data about the berries instantly to certifying authorities from the connected farm makes it easier for the grower to obtain the certification needed and charge a better price for their fruit.

Having access to the information on the database while the crops are still growing can also help reduce waste, a key way to improve the sustainability of the broader agricultural sector.

The team first builds up the knowledge base, scanning images of different qualities of berries into the database using a handheld device. “The more data we collect, the more scenarios come in, the more knowledge is available,” said Nguyen. The machine deployed in the field compares its real-world findings with what is already on the database.

That quality certification mission is likely to be broadened out into other types of crops soon.

> “We train the rover and once it’s trained it knows what to look for.

Efficient Data Analysis

“We train the rover and once it’s trained it knows what to look for. Instead of guessing you’re now using machines that are far more efficient when it comes to analyzing the data. The mission is building up knowledge about farming – there will be a commercial model later,” Nguyen said.

The progress made during the project feeds into a broader trend within the agricultural sector, Kishore said, as large farming equipment manufacturers aim to make their harvesters more intelligent, with a view eventually to having them run autonomously. “They are going big on digitalizing those machines, so they need to be fed with data, with knowledge.”

One development as agricultural data collection technology matures may be to reduce the size of the equipment responsible for gathering the data in the field. “There is a move away from the specific rover, moving to a smaller data collection platform, with the specific aim of being able to scale this out to smaller farms,” said Nguyen. “There are cost and infrastructure limitations for a big rover. We’re migrating towards something more the size of a desktop computer attached to a current piece of apparatus such as a tractor or harvester.”

“Sustainable farming is very important for all of us and technology adoption is very fast in this sector,” Kishore added. “There is a high level of investment both on the public sector side and private companies investing in this space. The technologies are established but it’s about making it mature.

Taking Car Batteries to the Next Level

Akkodis Research is giving electric vehicles new roles and optimizing their use. From activating car batteries for the smart grid of the future to developing vendor-independent battery diagnostics, it's all about serving a greater cause and playing the best possible part in a larger network.

> The challenge is to put very diverse types of data coming from different sources together and to build a robust model capable of independently predicting the battery's state, regardless of the car manufacturer.

Trinidad Tapia
Akkodis Data Scientist

The Charge.COM and DeRIVE projects, both based in Germany and publicly funded, showcase significant differences while sharing striking similarities in their focus on the lithium-ion battery of electric vehicles (EVs).

Charge.COM aims to optimize the utilization of EVs in commercial fleets, with the battery playing a crucial role. Fleet operators require precise knowledge of each vehicle's battery performance and range to facilitate optimal route planning.

However, batteries degrade over time, and vehicle manufacturers do not provide uniform data interfaces for transmitting the battery status.

As a result, there is no way to determine the battery status and the associated range in a standardized, cross-manufacturer manner.

Vendor-Independent Diagnostics

To overcome this, Project Manager Viktor Dick, along with Akkodis Data Scientist Trinidad Tapia and their colleagues are developing vendor-independent battery diagnostics. This innovative approach provides fleet operators with vehicle-specific and cloud-based battery status information, empowering them with accurate insights.

While the Charge.COM project is optimizing the use of EVs in commercial fleets, the DeRIVE project is integrating the EV's battery into another kind of network: the decentralized energy grid of the future. This visionary concept envisions using car batteries to fulfill network-related tasks, for instance as temporary storage for wind or solar energy, subsequently utilized when needed.

For that vision to become reality, batteries must not only be able to pull power from the grid, but also channel it back into the grid. Akkodis Project Manager Niklas Ehrlich and his team are working towards this goal, paving the way for enhanced grid integration

University collaboration

In both projects, Akkodis' engineers are collaborating with university researchers, with Akkodis serving as a commercial partner. The results of both projects will flow directly into downstream services of Akkodis' own EVACharge solution. The development of EVACharge began in 2012 and has since achieved a market share of more than 30% for DC fast charging points in Europe.

Before the outcome of the two research projects will be ready to expand the functionality, compatibility, and application options of EVACharge, there is significant work that needs to be accomplished.

"The challenge is to put very diverse types of data coming from different sources together and to build a robust model capable of independently predicting the battery's state, regardless of the car manufacturer," said Trinidad Tapia, Data Scientist with Akkodis.

To address this challenge, access to a small fleet of vehicles allows the team to measure how real batteries behave under different circumstances. In addition to that, a battery simulator can model different charging conditions with high precision.

"The simulator enables us to validate our measurements and enhance the accuracy of our model. Also, we have data from various research papers, and we have charging data from Akkodis' own EVACharge solution. It's worth noting that although we have access to extensive data, we lack direct access to the battery health information held by car manufacturers, as they consider it proprietary and do not disclose it to external parties," said Tapia.

Machine Learning

The Akkodis team is confident they'll be able to develop an efficient AI solution for predicting the state of health of the battery, based on the data available to them. They're moving rapidly toward achieving the project's final goal - developing a model that predicts the battery's condition based on charging data alone.

"It is always a matter of the data available," said Tapia. "Various algorithms exist within the realm of machine learning, that can be used according to the type of data available, the richness of the data and the variables involved. So, we have a lot of methods we can apply."

Akkodis has its own communication solution, which is implemented in the EVACharge Communication Controller mounted in a charging station. The communication controller can gather the necessary information, like charging power, charging amperage and battery temperature. This information is then fed into the predictive controller model algorithm, allowing the battery's condition to be accurately estimated.

The diagnostic algorithm coming out of the Charge.COM project will allow Akkodis to set a cross-vendor standard for the health of a car's battery. This information holds great importance not only for fleet operators in optimizing their route planning, but also in assessing the value of a vehicle and the options for its second life. Furthermore, it opens significant business opportunities for EVACharge to incorporate this feature into their product.

EVACharge Communication Controller

ISO 15118 Compliant Controller for Electric Vehicles & Charging Stations

Charge Controller in Electric Vehicle Supply Equipment (EVSE)

Charge Controller in Electric Vehicles (EV)

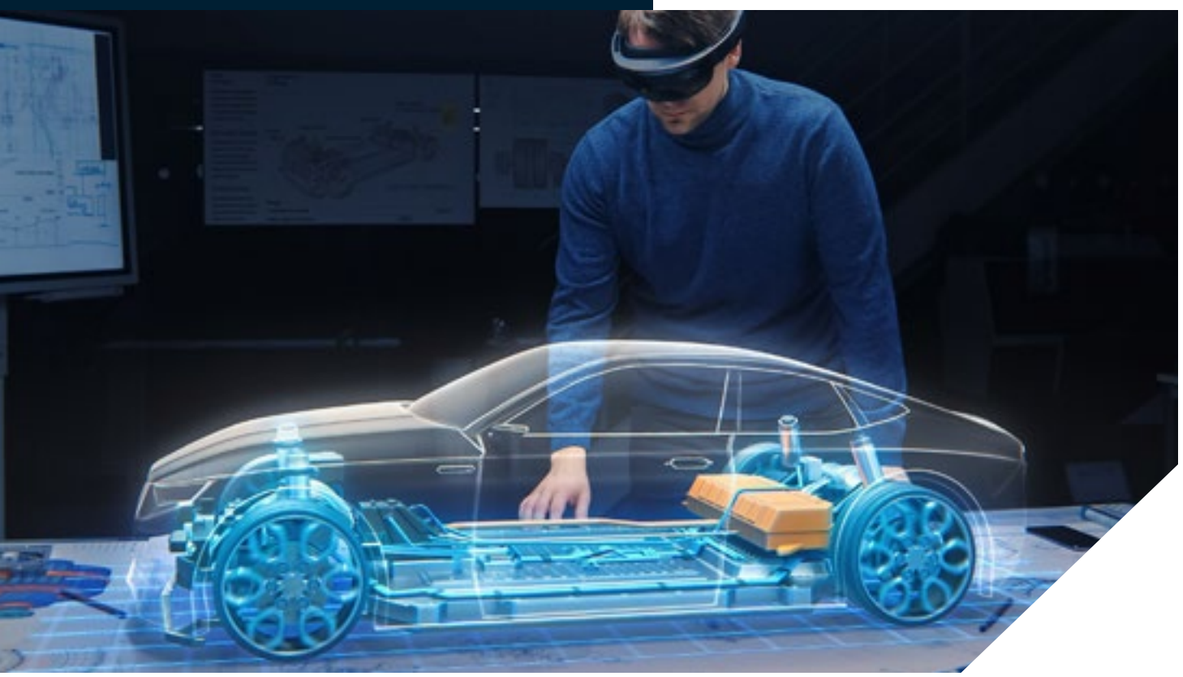
> The first approaches we are seeing are cars that can give back energy in small amounts. It’s called Vehicle-to-Home.

Vehicle-to-Grid

The DeRIVE project contributes to the development of the EVAcharge solution, but in an entirely different way. It focuses on what is known as the Vehicle-to-Grid (V2G) concept, making electric vehicles active players in the decentralized energy grid of the future. This forward-looking approach recognizes the need for storing and utilizing the fluctuating energy generated by renewable sources such as wind and solar. Car batteries could provide part of that storage, and researchers predict that by 2050 the European energy system will have 3,097 GWh of storage capacity coming from EVs at its disposal.

However, to get to that point, a number of challenges must be overcome, both regulatory and technological. Currently, there are no cars available on the market with the capability to fully participate in V2G systems.

“The first approaches we are seeing are cars that can give back energy in small amounts. It’s called Vehicle-to-Home. You plug in your vehicle when you’re at home and use your solar panels to charge it, and to give back energy at night for your fridge or other home appliances. This requires a special inverter in the c ar or wall box that transfers energy from the vehicle to your home,” said Niklas Ehrlich, a key member of the DeRIVE project. “However, the power output is limited to around 3 or 4 kilowatts, making it less efficient, with high costs and low earnings potential.”



The team wants to take it to the next level, which is when the vehicle is connected to a public fast charging station with a power output of 50 kilowatts or more. The car owner may be at work or on holiday, and during this period the car’s battery can participate in the network.

Cars and Charging Stations

Realizing the vision of Vehicle-to-Grid requires multiple components to work seamlessly together. First, cars need to have the capability to deliver sufficient current from their batteries through the charging cable and into the grid. Then, charging stations must be capable of not only transferring the power from alternating current to direct current to the car, but change the direct current coming from the car to the alternating current for the grid.

Moreover, there must be communication between each car and the demand side of the grid, to create an overview of the amount of storage capacity and how much energy is needed. Lastly, the implementation of a robust billing system is crucial for accurately tracking and compensating for the energy exchanged between vehicle and grid.

Test Vehicle and Charging Prototype

DeRIVE is a large research project with numerous participants, both commercial and academic. Akkodis is primarily focused on advancing its own EVACharge solution to a new level. Akkodis’ engineers are developing a new EVACharge prototype for bidirectional charging, based on ISO15118-20. The prototype will be equipped with demand-side management services, which are relevant for the charging communication and routing information for the vehicle’s Battery Management System.

Also, they are converting a test vehicle to support bidirectional charging and integrating both the vehicle and a charging point prototype into the infrastructure of the network operator participating in the DeRIVE project.

Charge.COM is funded under the Bavarian Collaborative Research Program (BayVP) as part of the funding line Digitization – Information and Communication Technologies AI-Big Data according to the Strategy Bavaria Digital and the Hightech Agenda Bavaria.

Academic partner: Institute of Automotive Technology at the Technical University of Munich (TUM).

Duration: 3 years

DeRIVE is funded by the German Federal Ministry for Economic Affairs and Climate Action.

Academic partner: Rheinland-Pfälzische Technische Universität Kaiserslautern Landau.

Industrial partners: Stadtwerk Haßfurt GmbH, Expleo Germany GmbH, Es Geht! Energiesysteme GmbH, Hubject GmbH.

Duration: 3 years

Electrifying
the Boat Industry

Akkodis' Automotive Expertise Unveils New Horizons for Water Transportation

Akkodis is sparking off a sea change, drawing on its automotive industry wire harness expertise to develop the wiring for a new hi-tech electric cruiser on hydrofoils.

The Candela C-8 promises to eliminate two of the most challenging things about speed boating: engine noise and the boat punching its way through the waves. An all-electric drivetrain eliminates the noise, while hydrofoils turn the punching into a magic carpet ride, lifting the boat out of the water for a smooth ride and a top speed of 30 knots.

The C-8 has been described as an "iPhone moment for boats" and a "Tesla on water." Built in 100% carbon fiber, and with a price tag starting at 290,000 euros, the C-8 may not be affordable for everyone, nevertheless it's a step towards the electrification of boats and ships, large and small. Much is happening in that area, not only related to people enjoying spending their free time on water, but also development of electric ferries, and even experiments with electric container ships.

Transformation on the High Seas

Per Fernlund at Akkodis in Sweden, is excited about the organization playing a part in the electrification of transport. Fernlund says Candela is an interesting company to work with, since it is preparing other disruptive electrification projects such as the P-30, the world's first electric hydrofoil shuttle ferry.

In the Stockholm area, where Fernlund is based, several other companies are working with electrification of transportation, batteries, electric motorcycles etc. New companies are popping up all the time.

> In my opinion that's a good thing, not only for the environment. It's good for the development of the Stockholm area and it feels great to be a part of that.

The Akkodis team of engineers have designed the wire harness of the C-8, using their expertise from the automotive industry. But the Candela assignment has posed new challenges to the team. For instance, the boat industries have their own standards to follow. Also, the harness had to be as weight optimal as possible, to give the boat maximum range per battery charge, as well as for the environmental impact and for cost-saving reasons. On the other hand, what made the job easier was the fact that a high-end cruiser offers more room for cables than, for example, the tight spaces in a truck cabin.

Building Prototypes

Doing the wire harness for a boat has been a first for Akkodis in Sweden. Another new addition to the service portfolio has been the building of prototypes, which began about a year and a half ago.

"Before that we focused solely on working as R&D consultants. Still, that's what we usually do: designing and developing a wire harness and leaving it to someone else to build it. But now we can also build prototype harnesses, and we can do several iterations and optimize the harness along the way. That means we can deliver a final harness design that is thoroughly tested and in a shorter time," said Fernlund.

From Hand Built to Volume Production

According to Fernlund, Akkodis normally works for large industrial companies with a lot of powerful manufacturing machinery. Candela, however, is a young company which up until now has produced hand-built harnesses. For this setup, Akkodis' own prototype workshop has manufactured several prototype harnesses. They've also helped Candela get ready for volume production.

Previously, when the boats were built mostly by hand, it took weeks to install the harness. We have been working on bringing installation time down to a few hours, because that's what's needed when you increase production volume. Moreover, as we know the market well, we've helped Candela find good and trustworthy harness suppliers. We sent a data package with all details out to several cable harness suppliers for quotes. After a couple of weeks with questions, discussions and presentations, Candela decided to collaborate with one of them to optimize and deliver harnesses during the industrialization phase of production.

> The C-8 has been described as an "iPhone moment for boats" and a "Tesla on water".

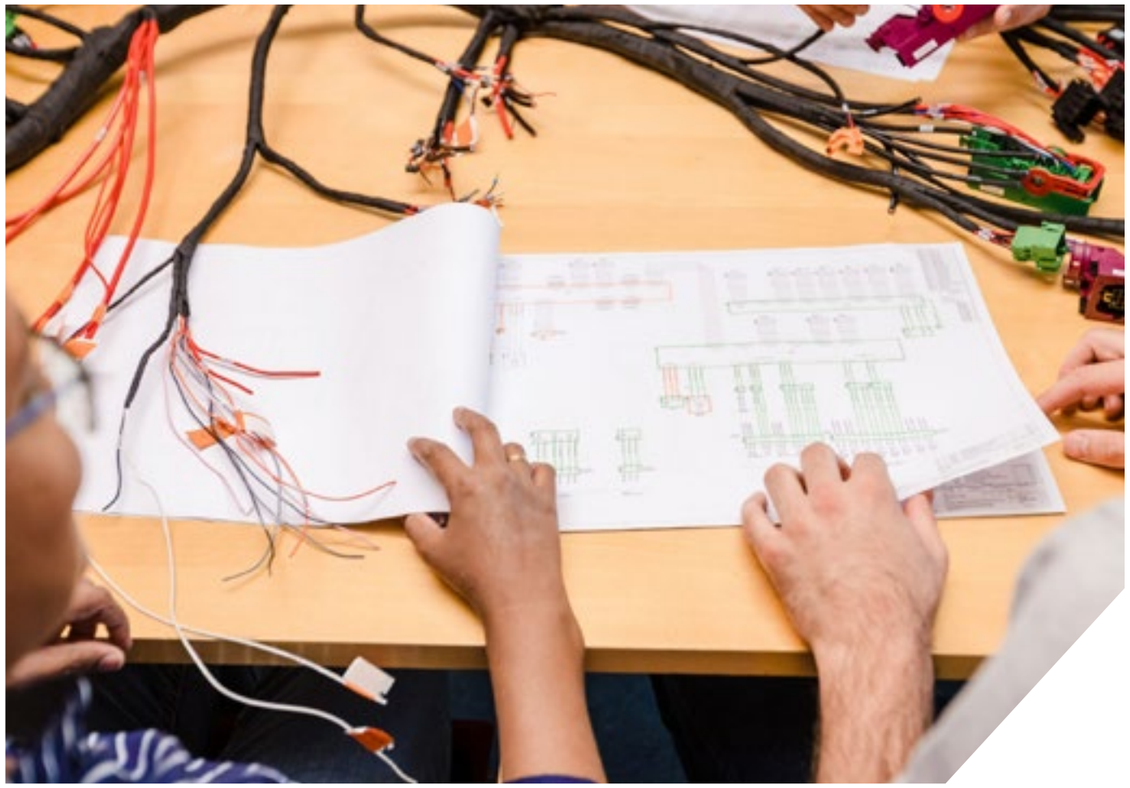
Workshop Training

Fernlund says working in the prototype workshop and assembling wire harnesses based on computer generated designs is an extremely rewarding training exercise for the Akkodis engineers.

With wire harnesses, you can't do everything in the computer. Because cables behave differently in reality and are exposed to the surroundings in ways that are hard to see in the 3D world, you must do physical testing as well. Also, there is much manual labor involved in production of a harness.

"There is a lot of craftsmanship to it, and on top of that, wire harnesses come with thousands of small variations. So, our in-house workshop is good for our customers, and good for us internally as well. It stops us from becoming too theoretical, and we learn a lot about all the tiny details that are so important in this line of work."

Fernlund is hoping that Akkodis will get the opportunity to continue the working relationship with Candela. And, most of all, he's looking forward to summer, hoping to test ride the C-8.



Crypto-Gin Highlights the Potential of Blockchain

Distributed Ledger Technology (DLT) will change the way we interact digitally with each other and Akkodis has been working with a gin distillery to demonstrate how.

At first glance, a bottle of gin does not seem to have much in common with digital technologies and smart cities. But Akkodis has made use of a collaboration with a distillery in Germany's Black Forest to show what DLT can do.

DLT, which securely stores and guarantees the transparency of data, has the potential to revolutionize industries, ensuring security through encryption, code and digital signatures and helping organizations build trust among their customers.

In a fast-changing, increasingly digital and interconnected world, DLT will have many applications. The smart cities of the future will need instant and secure data checks and a strong digital infrastructure. DLT technology is often decentralized, removing the need for a third party.

Data permeability throughout the value chain is also a growing challenge. DLT can trace and record the use of materials and components across the life cycle of a product.

> You can show people a bottle and the Non-Fungible Token attached to it and make them realize that the future is already here.

Sebastian Weber
Head of Akkodis' DLT Development Group

The raw material used to make an electric vehicle's battery, for example, travels on a complex journey throughout its lifetime from mine to wholesaler, component manufacturer to automotive OEM, customer to recycling point. Each of the links in that chain stores and protects its own data. The data security of DLT allows for permeability of that data along the value chain–because it is trusted by every participant.

"Using DLT, we can offer companies a system for secure data transition between the data silos of different market participants," said Tamas Bardos, DLT Technical Sales Manager.

As environmental scrutiny intensifies, companies will see an increasing need for ensuring the reliability and security of the CO_2 data they need to report.

Connecting the Physical and the Digital

Back to the Black Forest. The term "phygital" describes an experience–often in retail–which crosses the divide between the digital and the physical worlds, connecting a physical product to a digital component.

In this case the product, Crypto-Gin, combines a (physical) bottle with a digital twin of the same bottle, designed to appeal to gin afficionados.

The Akkodis DLT team developed a phygital Non-Fungible Token (NFT) decentralized app for a limited edition of Crypto-Gin, allowing customers to invest in a NFT they can redeem for a bottle of gin, while still keeping the digital twin as a collectible or to trade.

The implications of the technology behind the project go far beyond the realms of collectibles, however.

"We decided to take on the Crypto-Gin project because it is a good use case on how to connect the physical and the digital," said Sebastian Weber, head of Akkodis' DLT development group. "You can show people a bottle and the NFT attached to it and make them realize that the future is already here."

A label on the gin bottle features a patented holographic "fingerprint" provided by Authentic Vision, a world leader in mobile authentication solutions. The label guarantees the highest level of security. It can't be removed, and tampering attempts are automatically detected with any smartphone using Authentic Vision's own CheckIfReal app.

Secure Digital Platform

On top of that, the Akkodis team built a decentralized application running the DLT IOTA, which supports feeless transactions and micropayments for Internet of Things (IoT) use cases. The team believes IOTA will play a huge role in the adoption of DLT in an industrial setting, as feeless transaction is required in most industry use cases.

Crypto-Gin's name is a nod to the blockchain technology behind cryptocurrencies. Blockchain is a type of distributed ledger technology (DLT) that securely stores data and guarantees that it is accurate, unaltered, synchronized and transparent. That makes DLT ideal for providing a secure digital platform for voting, transactions, reporting and other situations in which trust, transparency and accuracy are essential. The technology holds the potential to solve many problems companies face in an increasingly complex and interconnected world.

Do we need all that tech to buy a bottle of gin, you might ask? Well, not necessarily, and you can still buy a normal bottle of Black Forest gin in the distillery's online store. But this project appeals to collectors and opens the door to a new type of customer base seeking rare and unique products.

Akkodis' goal is to help customers embrace new technology and use it to innovate and produce positive business results, an area that is set to become even more important, with Web3's focus on decentralization, blockchain and token-based economy.

DLT also offers exciting opportunities for the many young, talented coders and startups that are rethinking the status quo and want to build something new.

"They want to work on the newest technologies, and they do art projects, play trading card games, or work on cool cutting-edge tech projects in the field of identity management for smart cities, IoT devices or autonomous driving," said Weber.

The reach goes beyond the younger generation. Akkodis intends to integrate the dynamics of the startup sphere and of emerging technologies into the well-established, mature, and global consulting setup of Akkodis, allowing it to introduce DLT to large customers, which often tend to be skeptical towards startups.

"Normally it takes ages to bring emerging technologies like DLT to the big players. We want to change that," said Weber.

> Now we're in a phase where we can move beyond proofs of concept to executing complex real-world projects with a clear ROI.

Mature Enough?

The Akkodis DLT team is passionate about DLT and its potential. However, as with any other emerging technology, maturity is a key issue and for DLT, being secure and impenetrable is the technology's raison d'être.

One of the strengths of DLT is that everything is open source. That means everyone can attack it, and that is, in fact, a huge benefit. In the past few years, many have tried.

"Thousands of people from different companies and countries have tried to break it," Weber said. "The result is that these systems are super resilient. The surviving technology is battle-tested. In fact, it is better tested than if you had your own team of one hundred testers."

"We established our DLT team about three years ago and began building competences. Back then the technology was not as mature as we would like it to be, but it has been evolving very fast," said Weber. "Now we're in a phase where we can move beyond proofs of concept to executing complex real-world projects with a clear ROI."

Global DLT Team

As well as the Crypto-Gin project, the team has built a digital twin of an e-bike to ensure trusted traceability, including proof of origin, ownership, and transfer of ownership using DLT as point of contact. Chain2Bike can reduce costs, increase the security of e-bike ownership, and help avoid data breaches. That's just the beginning. The DLT team is growing, with the goal of developing the capacity to deliver large projects globally to big and established clients.

> We are building a global team with the capacity to deliver projects everywhere. We want everything decentralized–the technology, the people and the delivery.

Working with DLT is also a highly efficient way to attract tech talent, often a struggle for tech companies. For Akkodis, it has been the opposite.

"We have received incredible feedback," said Weber. "People who've heard about our DLT projects have found our email address and sent us their CV. They tell us they want to join a company as innovative as ours, and work with cool technology and cool projects."

Stealth is the Ultimate Goal:

Controlling the Acoustic Signatures of Marine Vessels

Water carries sound. Noise moves faster and travels longer distances through water than through air. Therefore, the more discreet a submarine is, the less vulnerable it is to external threats.

The ping of the on-board microwave oven can be heard far away, as can the noise coming from a crew member taking a shower. Although submarines are designed for stealth, they will always emit noises of some kind. These noises come from three major sources; the thruster, the interaction between the flow and the hull, and the internal sources, particularly rotating machines.

In the maritime industry, a vessel's operational stealth is a vital indicator of its performance in the same way as speed and maneuverability. Stealth allows ships to operate undetected against specific threats in designated mission areas. Thus, it's important for manufacturers as well as end users to be able to estimate, manage and control the acoustic signatures of vessels.

Akkodis' expertise in acoustic recognition and acoustic signal classification as well as its ability to deliver a comprehensive end-to-end solution played a major role in its selection by a large European defense contractor to participate in a major program centered around developing technology for the ship of the future. Akkodis' focus is on developing the digital ecosystem to help determine the real-time acoustic footprint of submarines.

Key Account Manager Defense & Security Mikaël Marsal explains:

"The overall objective of this system is to minimize the sound of the vessel. It will make it possible to draw up an estimate of noise generated from sources inside the vessel, which was previously difficult to assess due to the quantity and diversity of the data. To do so, it is important to have an overview of the sounds and their characteristics. When that overview is established, it is then possible to start reducing self-produced noise and thus improve the vessel's ability to stay outside the detection range of hostile vessels."

Detecting and Analyzing Noise Sources

At low speeds, noises originating from inside a submarine remain the prevalent source of its acoustic signature. The Akkodis solution presents a sectional view of the submarine making it easy for the crew to determine where, and from which on-board systems, noise is coming from.

A large number of sensors feed measurements into a database with the capacity to segregate data sources, analyze them and produce reporting and visualization of the vessel's acoustic footprint in real-time.

For this, Akkodis utilizes its own "Dataakod" platform, which ensures digital continuity between data sources and their uses. It is made up of open-source big data and data science software as well as software libraries developed by Akkodis to secure and simplify the industrialization of data projects.

According to Marsal, Akkodis' developers have put special effort into designing the system's HMI (human-machine interface). Having an operational military background himself, Marsal knows the importance of a simple and easily understandable interface allowing for a high level of interactivity and ease-of-use for the crew, which is often working under pressure.

"The analysis the system performs is not simple at all. Nevertheless, what we present to the crew must be simple and designed to minimize the potential for error. So, we've put a lot of work into analyzing how the crew works and how to build an interface suited to them."

Potential Applications Identified

The project is in its early stages, with the development team focusing on building the digital infrastructure to collect and process sensor data and to structure the data for visualization.

At this point, the emphasis is on engineering the system. When that is done, it will be time to look further into concrete use cases.

The client and the Akkodis development team have already identified a range of applications where the submarine's real-time acoustic footprint could come into play, and where, in time, the system will allow for a significant reduction in the vessel's signature.

It could optimize the functioning of the submarine's Golden Ear. Golden Ear is the nickname for the people and on-board systems listening to outside noise, to determine the position of hostile vessels or other factors crucial to the submarine's mission. If the Golden Ear is aware of the vessel's acoustic footprint in real-time, it can filter out its own noise to focus on what's important and potentially dangerous: outside noise. By improving the Golden Ear's ability to differentiate between internal and external noise, the vessel can more effectively locate hostile vessels, thus ensuring safety of the crew and maintaining the integrity of the mission.

The system also has the potential to improve maintenance of the submarine. Through cross-analysis, aging parts could be identified and changes in the vessel's acoustic footprint could point to machinery or components behaving differently than expected, such as vibrational sensors revealing bearings that need replacement.

Offering a Comprehensive Solution

The development team is building the software on top of a similar solution originally designed for a completely different domain – insurance - chosen because, data management and architecture are state-of-the-art, and easily applicable to the new use case.

According to Marsal, this has allowed Akkodis to offer the client an overall package which encompasses multiple domains of expertise. The proposed solution, which is to be carried out in three secure Akkodis sites, includes software development, analysis and reporting as well as database segregation and administration, making it even more effective and fit for purpose.

"

Although we are in the early phases of the project, our client is convinced of the utility of the solution and satisfied with the progress made so far. We're confident we can support them on their journey towards the ultimate goal: to be the quietest vessel in the ocean.

Get in touch with our
Aerospace & Defense Experts

About Akkodis

Akkodis is a global digital engineering company and Smart Industry leader. We enable clients to advance in their digital transformation with Consulting, Solutions, Talent, and Academy services. Headquartered in Switzerland and part of the Adecco Group, Akkodis is a trusted tech partner to the world's industries. We co-create and pioneer solutions that help to solve major challenges, from accelerating the clean energy transition and green mobility, to improving user and patient centricity. Empowered by a culture of inclusion and diversity, our 50,000 tech experts in 30 countries across North America, EMEA and APAC, combine best-in-class technologies and cross industry knowledge to drive purposeful innovation for a more sustainable tomorrow.

We are passionate about Engineering a Smarter Future Together.

Read more about how we
Make Incredible Happen

Engineering a Smarter Future Together.

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