

# MODULAR ENERGY STORAGE Flexibility made simple

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SMART ENERGY STORAGE

By developing the most convenient and future-proof solutions, we serve the growing need for energy storage and speed up the transition to green energy for our customers and society as a whole.







## ENABLING THE GREEN CHANGE

The electrification of our society is putting pressure on an already congested and unstable grid.

Our innovative technology is revolutionizing the way energy is stored and used. This contributes to the UN's sustainability goals by enabling homes and businesses to make the most of their energy and reduce their environmental impact.

With the ever-increasing effects of climate change, the need for renewable energy sources that provide clean and reliable power is critically important. Sustainability targets and government initiatives will accelerate the green change.

PIXIIBOX INSIDE

### MODULAR ENERGY STORAGE, FLEXIBILITY MADE SIMPLE

At the core of all energy storage solutions from Pixii, is the PixiiBox. An advanced bi-directional power conversion module. Bi-directionality means that the energy can flow both ways, from grid to the battery and back to the grid, through the same power electronics.

Our modular approach allows our solutions to be finely tuned to customer needs, while lowering barriers to implementation. The desired capacity can be reached by adding the required number of modules to a cabinet. If more power or more energy storage is required, several cabinets can be installed. This makes it possible to scale the system to the power and energy required for a given application at a given time with the ability to adapt to future needs.



#### **Decades of research**

The modular design of our energy storage is the result of decades of research and development in world class power conversion technology. The Pixii Research and Development Team enabled Pixii to be the first company to launch a modular and scalable energy storage platform.

With growing complexity in the energy market, you need a software configurable battery energy storage system that is flexible and will adapt to your needs, ensuring you always get the most from your investment. The PixiiBox is a bi-directional AC/DC power conversion module, allowing you to seamlessly scale both power conversion and energy storage capacity, with a range from 3kW to 1MW and beyond.

It connects with a wide range of energy sources, like solar, grid, generator and more, giving you unrivalled flexibility.

The PixiiBox will automatically be configured to different functionalities depending on the location in the system.

#### Monitoring and control

The Pixii Gateway is an advanced controller with a variety of connections, ports, inputs and outputs. The Gateway enables measurement of important parameters, communication with all components within the system. It oversees battery management, battery health and provides connectivity to the outside world.

It gives you full flexibility with MQTT and Modbus protocols, allowing you to integrate with 3rd party management software and connected hardware.

The Pixii Gateway can act as an individual controller, or as a master, controlling a cluster of Pixii cabinets as one.



The PixiiBox is a hot-pluggable softwaredefined power conversion module

#### **PixiiBox - Key features**

- Multi-functional: Bi-directional inverter MPPT solar converter Rectifier Inverter
- Units can be connected in parallel
- Hot-pluggable and high efficiency
- High power density
- Add more units as your power need increases

### Pixii PowerShaper

The Pixii PowerShaper is a scalable energy storage solution that adapts to your changing demands.

You can customize your system by adding more cabinets, each with a 50kW capacity, to match your load requirements.





Pixii**Home** Energy storage 10kW/20kWh

Pixii home is a compact, all-in-one energy storage, saving you cost and reducing your dependency on the grid. It can have integrated MPPT modules or it can operate with an AC coupled existing solar installation, allowing you to store excess energy for later use.

With smart functionality, you can store energy from the grid when the tariffs are low and use it when the cost is high.

Pixii home comes with a smart home hub, allowing you to manage energy hungry home devices like cooling and heating to further reduce energy consumption without compromising on comfort.



Pixii**PowerShaper** Energy storage 50kW

Unlock the flexibility market with our quick to deploy energy storage system.

The PowerShaper is a modular system for up to 50kW. For higher power and energy requirements additional cabinets can be added.

It comes with wide range of services making it suitable for many different markets and applications.

The PowerShaper is available in fan-cooled or air-conditioned outdoor versions and fan cooled indoor version.



Pixii**PowerBase** Preconfigured up to 600kW

Reduce your installation time on site with the pre-wired PowerBase.

The Power Base 600 is a robust energy storage system on a steel frame with the footprint of a 20-foot container.

It comes with 12 Pixii PowerShaper cabinets, pre-wired and pre-configured to reduce site preparations, installation time and cost.

Maximum power capacity is 600kW.



### MEETING MARKET NEEDS

Our modular battery energy storage system is ideal for a wide range of markets, allowing you to scale your battery energy storage with growing and changing needs.

Battery energy storage systems (BESS) are necessary to enable the green change by providing a reliable and cost-effective way of storing renewable energy. This helps to reduce emissions from traditional fossil fuel sources, as well as provide more stability for electricity grids that rely heavily on renewables.

Battery energy storage help improve grid efficiency by managing peak demand and allowing utilities to better plan for future growth.



#### **DSO/DNSP**

Decongest your grid and improve power quality with our flexible battery energy storage system.

With electrification of society comes high peak loads and uncontrollable distributed energy production, making it challenging to manage distribution grids designed decades ago. Grid operators need a quick-to-deploy and cost-effective solution to support aging assets and improve quality of supply.

The Pixii battery energy storage system is modular and comes with advanced functionalities, like voltage support, phase balancing, active and reactive power compensation, giving network operators the tools they need to ensure that the quality of electricity is according to the consumers expectations.



#### Commercial/Industrial

#### Reduce energy cost and unlock new revenue streams to meet green targets.

New green targets and pressing regulations are forcing companies to electrify their business. Our battery energy storage system allows for optimization of energy consumption and costs whilst unlocking new revenue streams.

The Pixii battery energy storage system is modular, allowing you to scale to your needs, keeping CAPEX low. Our solution is fully integrated, enabling you to get the most out of your new or existing solar installations. It allows for EV charging, and with smart functionality like time shift and peak shaving you can store energy during off-peak hours to reduce costs and manage energy demand.



#### Telecom

Activate your "lazy" power systems to generate new revenue streams from flexibility markets.

Bi-directional power conversion enables telecom infrastructure owners to generate significant revenue streams from flexibility markets.

Telecom networks around the world represent a great resource in power and energy which is hardly ever utilized. With modular bi-directional power conversion these assets can be activated, creating additional revenue streams. The telecom loads will have the same resilience, if not better.

Our 48 volt system is galvanically isolated, with hot swappable modules making it safe and easy to install and maintain.

#### DSO/DNSP FUNCTIONS



#### COMMERCIAL/INDUSTRIAL FUNCTIONS



Peak shaving



PV self consumption



AC back-up

Arbitrag

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Flexibility markets



DC or AC coupled solar

#### **TELECOM FUNCTIONS**





#### **EV Charging**

#### Multiply available power for EV fast charging in locations where the grid is weak.

With the rapid adoption of electric vehicles comes an increase in power demand. Upgrading old grid infrastructure is costly and time consuming. BESS enables fast charging in locations with weak grid – to meet the growing demand.

With smart functionality like time shift and peak shaving you can store energy during off-peak hours to reduce costs and minimize demand charge. You can also participate in the energy flexibility market

With the MPPT functionality in the PixiiBox our solution allows for seamless integration of solar energy.



#### **Residential**

#### Optimize your energy consumption and reduce cost with our smart BESS.

With rising energy cost, consumers have a growing need to minimize their energy spending and get more out of solar investments. They need a battery energy storage and management solution that is quick to install and easy to use.

With smart functionality, like time shifting and peak shaving, you will reduce your energy bill. It includes smart home functionality, allowing you to take control of energy hungry loads in your home and even to power your home from an electrical vehicle through a vehicle to load adapter, or any other additional power source, making it safe and easy to maintain.



#### **Micro Grid & Off-Grid**

#### Green, cost-effective, and reliable electrification.

Micro grids allows businesses and communities to operate where the grid infrastructure is not sufficient or unstable. Typical applications include fish farming, agriculture, mining and construction sites as well as enabling economic growth in remote villages.

Our BESS is a fully integrated solution. It distributes power from PV panels, AC or DC coupled, and will store your excess energy for later use. It can seamlessly integrate other energy sources, to ensure a reliable supply of electricity.

Remote monitoring and management allows for advanced optimization and predictive maintenance.

#### **EV CHARGING FUNCTIONS**



DC or AC coupled solar





Grid support

**RESIDENTIAL FUNCTIONS** 

Peak shaving



PV self consumption



AC back-up



Arbitrage



Flexibility markets



DC or AC coupled solar

#### **MICRO GRID/OFF-GRID FUNCTIONS**



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Community

battery



PV self consumption



#### OEM's

#### **Powered by Pixii**

Offer greater value with Pixii's smart power conversion technology to strengthen your position and grow your market share.

Collaborate with Pixii and excel with the latest in power conversion technology. opening new markets and revenue streams for your brand.

Our modular and bi-directional power technology is built on a 48-volt power architecture, with software driven hardware making it safe, adaptable and easy to scale.

SERVICES

Pixii BESS is more than hardware. With our range of services you will get access to our expert team, cloud services as well as software enrichment updates.

The Pixii Academy is an online support portal designed to help partners and installers educate themselves on the latest in Pixii's modular BESS technologies and best practices. Our online courses and webinars are led by industry experts and provide hands-on learning opportunities.

#### AC back-up

Protect your important loads against power cuts with our smart battery storage system kicking in to ensure uninterrupted power supply.

#### Arbitrage

Support loads from battery when electricity rates are high, and charge battery when electricity rates are low.

#### Active power compensation

Reduce operational cost of the network by adding smart energy storage, allowing you to consume or generate active power, to improve the performance of your network.

#### **Reactive power** compensation

Reduce operational cost the network by adding smart energy storage, allowing you to consume or generate reactive power, to improve performance and minimize energy losses.

#### Community battery

Shared battery storage embedded in your network, closer to the end-user, enabling customers to lower their energy bills by utilizing more renewable power, reducing carbon footprint and stabilizing the grid.

#### Flexibility markets

Unlock the value of your battery energy storage system and monetize your system's flexibility by selling stored energy or providing ancillary services, such as frequency regulation, to the electricity grid.

#### Phase balancing

Balance your three-phase load to provide utilisation of your upstream distribution network, by feeding power from phases with low load – to phases with high load and thereby stabilizing the phase voltages.

#### Voltage support

Monitor and maintain ideal line voltage in remote locations at low cost, by using our power management and storage solution as a buffer, enabling you to inject and absorb active/reactive power to and from the grid.

#### Peak shaving

Reduce your demand charges and save cost by shifting your power dependency from grid to battery, shaving the peaks of your power consumption. Boost available power without upgrading your grid connection.

#### PV self consumption

Get the most of your solar investment and reduce your grid dependency through smart power management, enabling you to re-direct excess power generation to batteries for later use during peak hours.

#### DC or AC coupled solar

With integrated MPPT functionality the Pixii BESS is a complete DC coupled hybrid system. Our technology can operate with most grid tied PV inverters, in on or off-grid mode, ensuring optimal value of existing solar installations.

#### MPPT

Maximize your energy extraction from solar installations in DC coupled hybrid solutions through PixiiBoxes operating as MPPT converters.

#### Gen-set integration

Take control of your diesel generators and get more useful energy per litre fuel consumed. Pixii makes it easy to integrate a generator into your system, providing energy in off-grid and poor grid locations.

#### FCR-D

Provision of power reserves that are automatically controlled based on the frequency deviation caused by disturbances in the electricity system.

#### FFR

Provision of synthetic inertia during situations with low inertia in the electricity system by having energy storage being standby to react with power within about one second after a significant frequency deviation.

### FCAS

Participate in the frequency control market with Pixii's smart BESS, allowing you to provide first-response frequency support and help stabilize the grid by taking part in VPP.

0	Extended warranty
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Annual maintenance



Technical Support





Software enrichments upgrades





Swap solution



Critical spare parts



DSO/DNSP First pole-top mounted battery energy storage solution in Australia.

Only the sky is the limit!

This is part of a \$10 million Queenslandfirst initiative aimed to help deliver "the renewable energy revolution".

As part of this project, neighborhood batteries are being rolled out across Ipswich as part of the Palaszczuk Government's Queensland Energy and Jobs Plan.

"The neighborhood batteries offers numerous benefits to communities including increased energy reliability, reduced energy costs, and a cleaner energy supply. These batteries will store cheap excess energy generated by the equivalent of nearly 600 rooftop solar systems during the day. Critically, they will deploy that cheap electricity during peak evening periods, lowering household energy bills."

**Mick de Brenni** Energy, Renewable and Hydrogen Minister

The PoleTop PowerShaper from Pixii, is an IP55 complete modular energy storage system. It is fully integrated with and ready to be connected to the grid for applications as grid support, solar self consumption, demand charge reduction, peak shaving, arbitrage, FCAS and FFR services.



#### **EV CHARGING**

#### Pixii and Elywhere's groundbreaking partnership. Innovating the future of EV charging - enabling fast charging in areas with poor grid conditions.

As the world moves towards cleaner and more sustainable energy solutions, the use of electric vehicles (EVs) is gaining popularity. Despite this trend, widespread adoption of EVs is still challenged by inadequate charging infrastructure. The biggest obstacle is the insufficient capacity of the grid. The cost and time to upgrade old grid infrastructure to meet the needs of fast charging is hard to justify financially, and time consuming to execute.

Circle K, the leading multinational service station and charge point operator, commissioned a pilot project from Elywhere in Ski, Norway. This project aimed to demonstrate the effectiveness of delivering reliable and convenient EV charging solutions, even in the most remote locations.

#### The solution

Circle K's Ski pilot project was solved with 6 Pixii Powershaper cabinets, offering 300kW output from a 40kW grid input. The cabinets were pre-installed on a 360kW EV charging platform, enabling the simultaneous charging of up to 4 vehicles.

#### The benefits

The Pixii solution multiplies the available power from the grid, enabling fast charging. It's standardized, modular design allows for the cabinets to be proven and tested at the factory, making installation, deployment and even relocation quick and simple, whilst enabling Elywhere to scale easily as demand grows.

EV charging drives traffic and sales. In addition to the revenue from kWh, fast charging gives drivers extra motivation to visit and make purchases while they wait, increasing sales, boosting the stations appeal as the destination of choice, and creating a steady stream of revenue.

It's smart functionality like arbitrage and peak shaving allows for storing of energy during off-peak hours, reducing costs and minimizing demand charges. And with no single point of failure, it is one of the most reliable and robust battery energy storage systems on the market, reducing the need for maintenance.

The Pixii battery energy storage system even enables businesses to participate in the energy flexibility markets, such as the balance market for frequency regulation, allowing them to monetize the system's flexibility for additional revenue streams. With a fleet of sites, this additional revenue can be significant. Since its launch, demand for charging has grown to 60-70 charging sessions a day, with up to 1 megawatt hour per day being sold. This level of performance would have been impossible without battery energy storage.



COMMERCIAL AND INDUSTRIAL Powering tour buses with solar power.

OsloBuss AS are using electric tour buses to align their business with green targets. At an old factory facility, just outside of Oslo, solar panels are covering the facade of the building. The solar energy is stored in a Pixii battery energy storage system (BESS), ready to charge the fleet of electric buses.

We believe this electric concept for transportation is leading the way for a greener and more sustainable way of people transport.



DSO/DNSP Supporting the national grid in remote locations together with Elvia.

Remote, mountainous terrain and a cold climate compound the difficulties of building and maintaining power lines. And a scattered population makes the business case of larger grid upgrades difficult to justify. On top of this, high penetration of electrical vehicles, high peak consumption, and load imbalance create low voltage challenges in the grid.

In low consumption periods, solar energy fed to the grid can create voltage peaks way above strict regulations.

Ironing out those peaks is a mainstay of DSO Elvia's mission, because it enables prosumers to participate in the Green revolution – making the grid more inclusive for renewable energy.

Elvia needed a flexible solution that's quick to install, with advanced functionality for phase balancing, and active or reactive power compensation.

The Pixii Powershaper2 allowed Elvia to effectively upgrade the grid, fast-forwarding a process that might have taken 10 years to just a few hours.



#### COMMERCIAL AND INDUSTRIAL Pixii delivers major battery energy storage system in Germany.

Power & Air Solutions (PASM), a Deutsche Telekom subsidiary, has completed its first battery energy storage system (BESS), supplied by Pixii.

"The current energy challenges in Europe underline the need for investments in energy storage. Battery energy storage systems are a key component in the green shift"

**Bernd Schulte-Sprenger** CEO of Power & Air Solutions The storage system is installed at one of Deutsche Telekom's main offices in Munich.

The installation has 1 MW of conversion capacity and 6 MWh of storage capacity. The solution is based on the PowerShaper product family. It will be followed shortly by a second installation in Münster.

In total, PASM plans to install battery energy storage systems with a total capacity of more than 300 MWh. This capacity will be used for peak shaving, arbitrage and to maximize the use of renewable energy, as well as to participate in energy markets to contribute to the stability of the German electricity network.



DSO/DNSP

#### 1MW battery energy storage will secure powersupply for businesses in remote areas.

You cannot build business without proper infrastructure.

Power hungry industries are entirely dependent on battery storage solutions if they want to establish business in areas with a poor grid.

This battery energy storage in Lierne in Norway is the largest of its kind and will supply power in municipalities with poor access to electricity

It is the very first commercial online battery that distribution grid companies can rent as a service.

It provides better utilization of the power grid, faster connection and saves the DSOs for significant investment in new infrastructure.

