



# Amp X

A technology ecosystem  
to future-proof the grid



## **A Message from Dr Irene Di Martino, Head of Amp X**

The energy sector has been undergoing an unprecedented transition which brings about a number of key challenges – voltage instability, due to the increased penetration of distributed energy resources; frequency instability and lack of inertia, due to greater reliance on variable and intermittent renewables; lack of grid resilience that can result in blackouts and the potential need for very expensive network infrastructure reinforcements.

With the electrification of heat and transport, consumers too will be faced with the challenges of timing their energy consumption with periods of low price, low carbon electricity. Energy retailers will be more exposed to increased wholesale price volatility and the risk of consumers' defection; as a result, energy retailers will need much better visibility and understanding of user behaviour and consumption data.

Amp X was established in Sept 2019 to deliver a disruptive digital energy platform for the edge of the grid to enable all forms of distributed generation and load to make a dynamic contribution in the energy markets, to provide increased system flexibility, resilience and stability at the lowest possible price.

We've been developing a data-rich platform that caters for a portfolio of interoperable products to help address the challenges of the energy transition. The Amp X digital energy platform relies on a transactive-ready system architecture and cloud-hosted state-of-the-art advanced analytics, with data sourced from a variety of different nodes across the grid. Autonomy is at the heart of our technology and relies on well-defined adaptive control which requires some robust edge analytics. This approach ensures that our devices can make the best decisions with the highest possible certainty at all times.

To address system resilience and stability issues, we've developed the Smart Tx – a next-generation transformer for the distribution network, capable of autonomously and dynamically managing voltage, modulating power flow to provide inertia into the system, as well as significantly improving the visibility in the LV network. The Smart Transformer technology will go live on grid in the U.K. in Q2 2021.

The Amp X transactive-ready Virtual Power Plant (VPP) solution optimises the dispatch of different assets, whilst managing their life in a cost effective way, thanks to our advanced predictive analytics. The Amp X VPP will go live in North America in Q2 2021.

We've also been focusing on the development of a holistic energy management system for behind the meter consumers to enable them to provide flexibility to the grid, whilst optimising their energy costs and carbon footprint. The Amp X Demand Side Management technology will see its first deployment in the U.K. in Q3 2021, in the Living Lab managed by the Energy Systems Catapult.

Amp X is developing a technology ecosystem to future-proof the grid and enable business model innovation. We look forward to engaging with different stakeholders to turn the challenges of the energy transition into strategic opportunities.



# Key Challenges

The increased penetration of dynamic loads at the edge of the grid is making generation increasingly decentralised and intermittent, resulting also in lack of inertia within the system.

Grid dynamics as a whole have become much more complex, threatening the resilience and stability of the electricity network itself.

Unlocking flexibility from Non-Wire-Alternatives (NWAs) at the edge of the grid and at a massive scale will be key in order to meet the challenges of the energy transition, whilst avoiding expensive network reinforcements.



Voltage  
instability



Frequency  
and Inertia



Blackouts,  
brownouts



Infrastructure  
costs

# Meeting the Challenges: The Amp X Data-Rich Platform

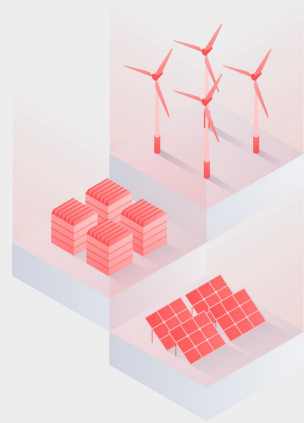
Our data-rich Aggregation Management Platform caters for a portfolio of interoperable products. It relies on a transactive-ready system architecture and cloud-hosted state-of-the-art advanced analytics, with data sourced from a variety of different nodes across the grid.

The Amp X platform allows all forms of generation and load to make a dynamic contribution in the energy market, to provide increased system flexibility, resilience and stability at the lowest possible price.

Smart  
Transformer



Virtual Power  
Plant



Aggregation  
Management  
Platform



Demand Side  
Management



Transactive  
Grid

# Amp X Smart Tx

## A future-proof infrastructure upgrade.

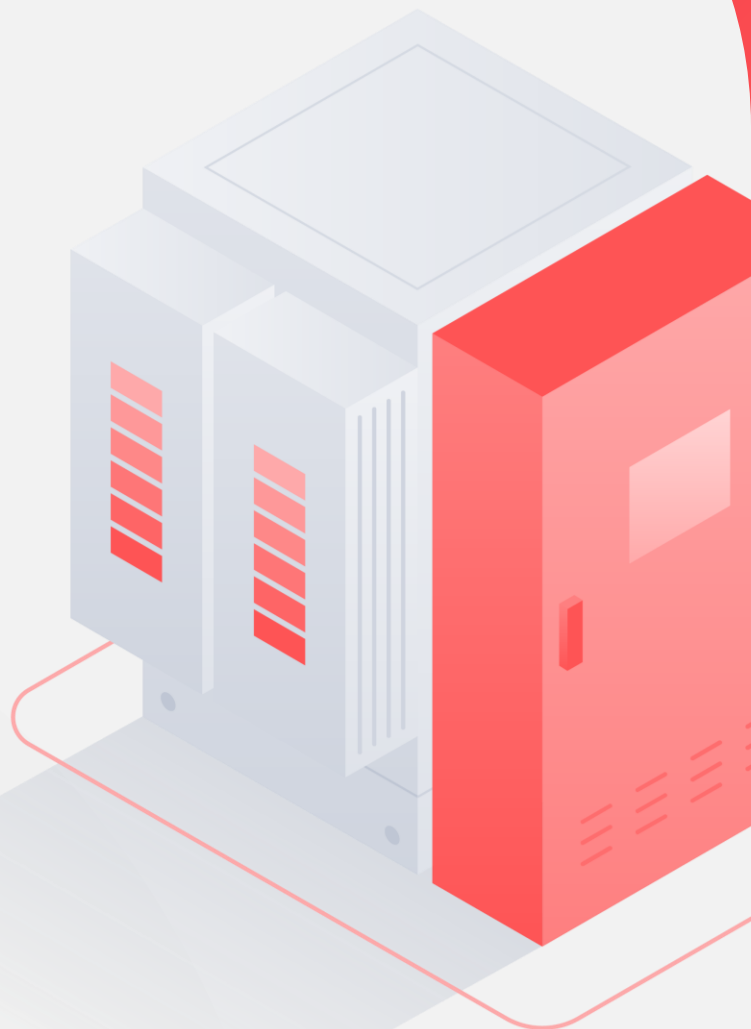
A drop-in replacement of a conventional distribution transformer, with no change in the existing substation footprint. Equipped with power electronics, state-of-the-art autonomy and an on-board processor, the Smart Tx can autonomously and dynamically manage voltage, and modulate power flow to provide inertia into the system, as well as significantly improve the visibility of the LV network thanks to its high-frequency data sensors.

Bus voltage  
stabilisation

Consumer voltage  
stabilisation

Power factor and  
harmonics compensation

Increased visibility  
within the LV network



# Amp X Virtual Power Plant

## A first step towards a zero-carbon grid.

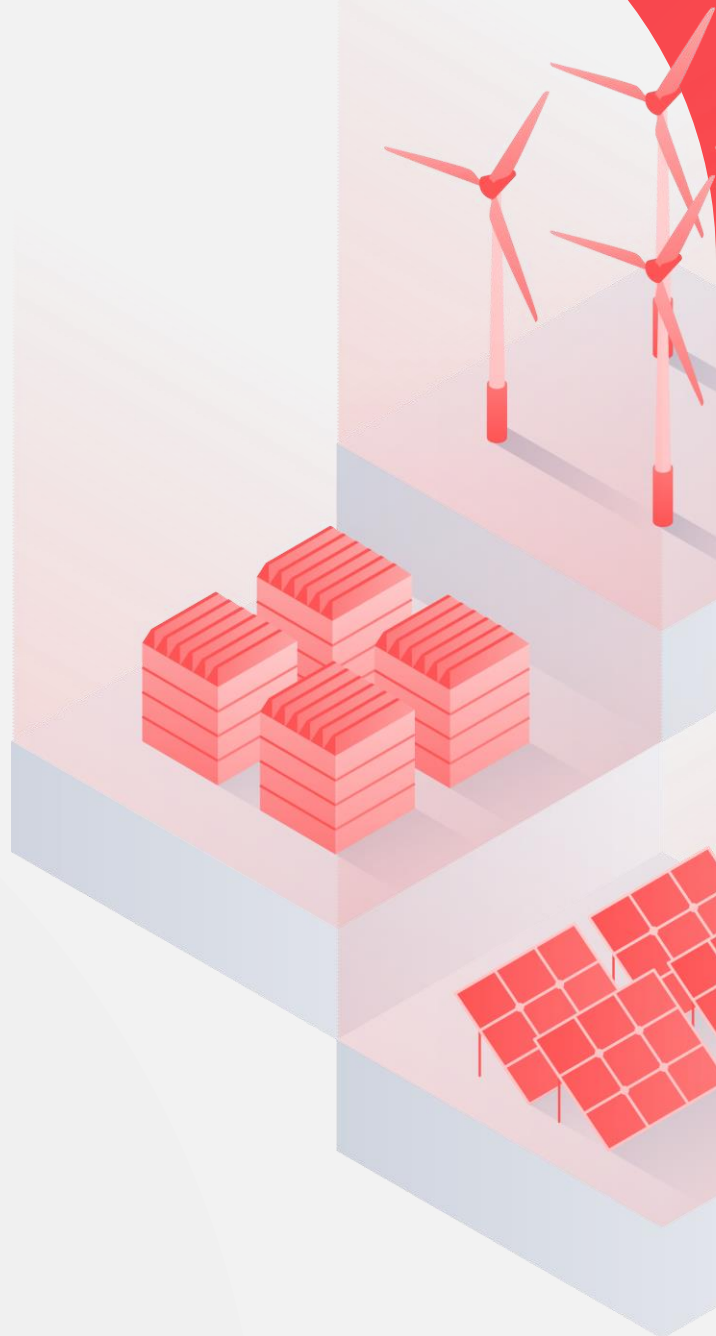
By emulating the behaviour of traditional power plants, groups of decentralised assets can participate across different markets in the provision of grid services, which would otherwise be impossible for them to access individually. The Amp X transactive-ready Virtual Power Plant (VPP) solution optimises the dispatch of different assets, whilst managing their life in a cost effective way, thanks to our advanced predictive analytics.

Advanced AI and  
ML technology

Asset  
management

Aggregation and  
dispatch optimisation

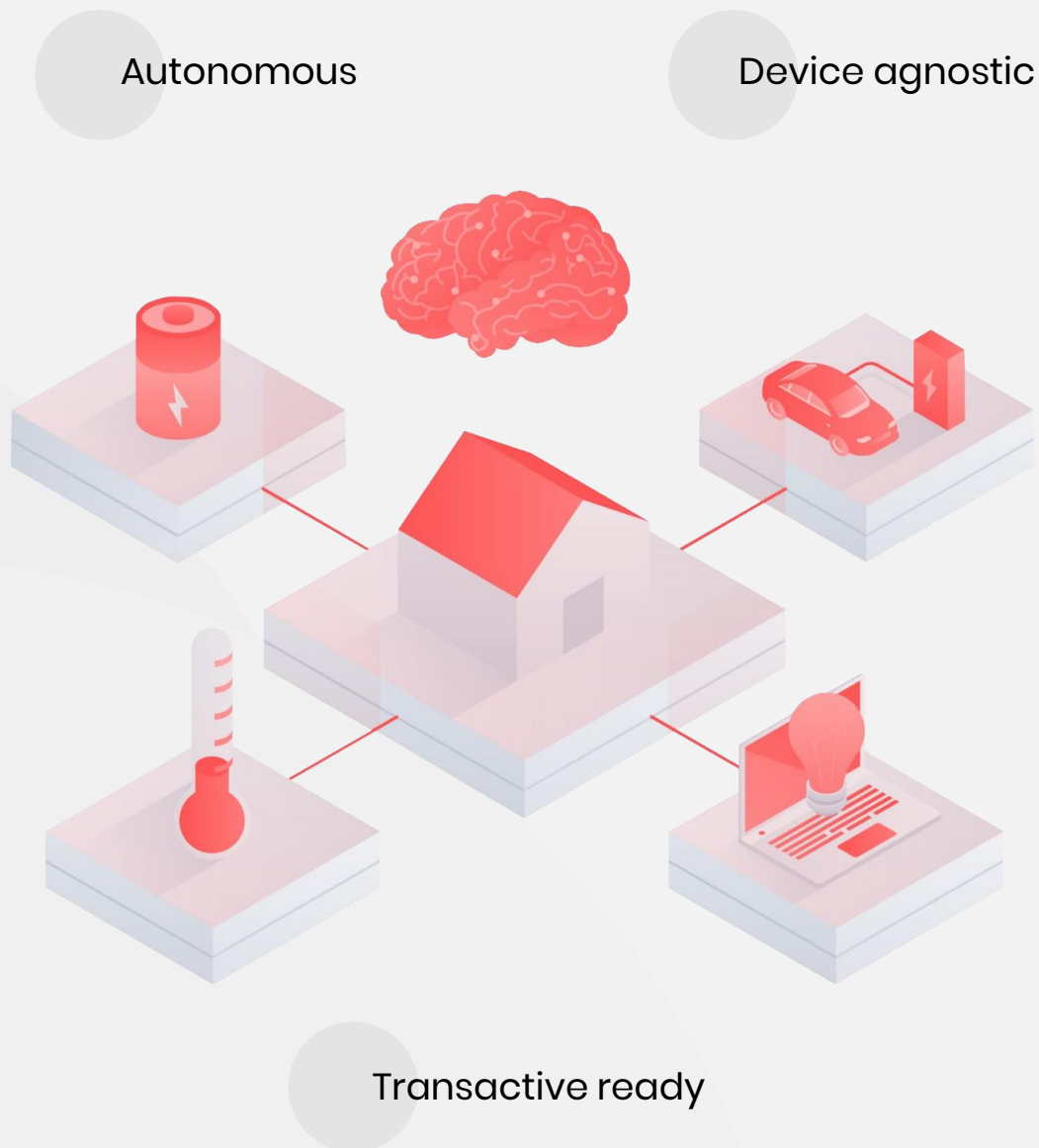
Transactive  
ready



# Amp X Demand Side Management

**Flexibility at a massive scale through device integration and autonomous control.**

The Amp X Demand Side Management is a holistic, consumer-centric solution, capable of autonomously optimising the schedule of different devices (e.g. EVs, batteries, smart thermostats, etc.) to enable consumers' participation in the provision of flexibility to the grid, whilst optimising their energy costs and carbon footprint.



# Amp X Transactive

## The future of energy transactions.

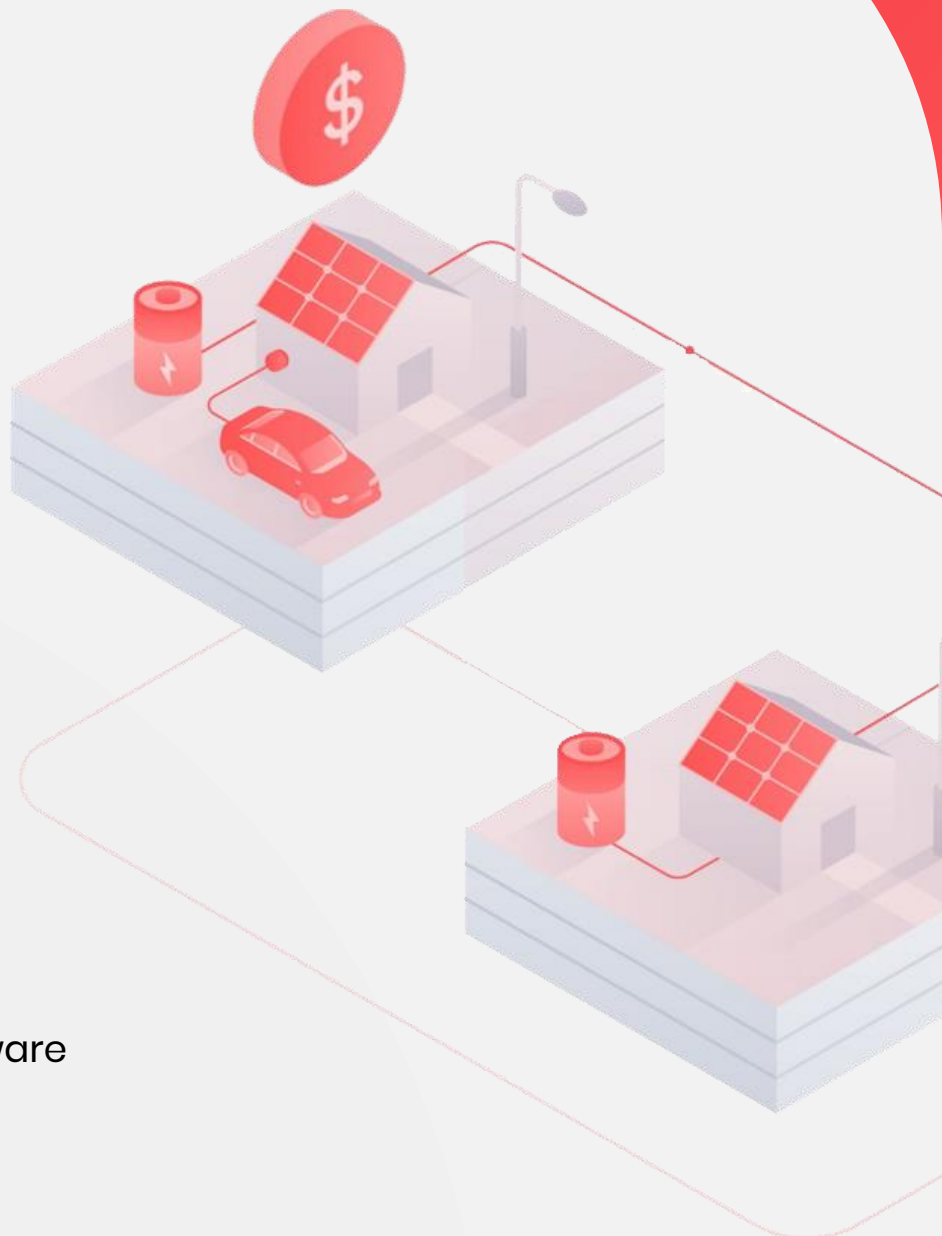
The Amp X platform is built to ultimately enable a fully transactive grid. Aware of grid topology and market constraints, the Amp X Transactive will make it possible for every consumer and producer to participate in a virtualised marketplace, while leveraging clean energy resources. Through real-time interaction between different nodes across the network, our platform will enable the decarbonised, decentralised, democratised and affordable grid of the future.

Scalable to  
any market

Device  
agnostic

Autonomous  
and predictive

Grid topology  
and market aware







## The Senior Leadership Team

A perfect amalgamation of knowledge and technical know-how.



**Irene Di Martino**

Executive Vice President  
Head of Amp X



**Rod Buchanan**

Key Technical Expert



**John Prime**

Head of External  
and Regulatory Affairs



**Petr Vojacek**

Head of Software  
Engineering



**Robert Suhada**

Head of AI and  
Machine Learning



**Vaclav Moulis**

Head of Communications  
and Control Systems



**Rafael Villarroel**

Head of Electromagnetic  
Design Engineering



**Mike Krastev**

Head of Product



**Nicola Di Marco**

Head of UX

ampX



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