#STOPBURNINGSTUFF

#STOPBURNINGSTUFF MANIFESTO

Time for action, time for electrification

Robert Llewellyn speaks to the most pioneering businesses in Britain in a special première for the **Fully Charged** YouTube channel.

This activity was made possible by the kind contributions of:

HEADLINE PARTNERS

BRITISHVOLT · GRIDSERVE sustainable energy · myenergi · Polestar

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eav · Kensa Heat Pumps (A KENSA GROUP COMPANY) · mixergy · octopus energy · Ripple · tepeo · VOLTA TRUCKS

#STOPBURNINGSTUFF

Foreword

When it comes to the climate crisis, it's simply not true to say that there is no hope.

Hope exists in the form of a select few technologies. Where the problem lies is in choosing the correct solutions, and in deploying those solutions at a speed proportionate to this almost overwhelmingly large problem.

There is, it seems, a myriad of options at our disposal, but we would do well to ask ourselves if we could only do one thing, what would that one thing be? That single question takes us back to the first principles that any scientific problem necessitates.

When it comes to carbon emissions, the principal cause of global heating, and in turn, of the climate emergency, is the combustion of fossil fuels*. Yes, 'burning stuff' is the chief culprit.

And yet, as a species, we seem unable to focus on this fact, and when distracted by the misinformed, or by the disinformers, we forget that the biggest single change we can make is to #StopBurningStuff.

Whether it is the energy used in the buildings we live and work in; the energy used to transport ourselves near and far; or the energy used to make the things that we consume, all of this can be significantly 'cleaned up', and with existing technologies.

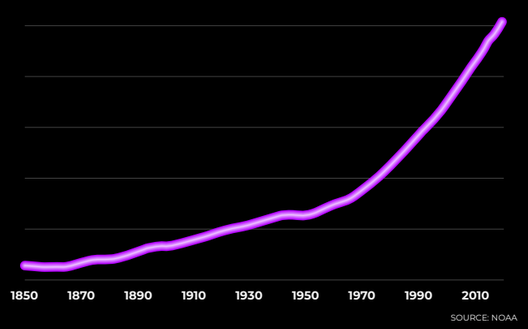
We wanted to take the opportunity that COP26 gives us – as a once in a generation event on the British Isles – to fix this thought firmly into the minds of as many people as is possible, and inspire them to act.

To that end, in partnership with some of the most pioneering businesses based in Britain, we have created a #StopBurningStuff YouTube Première and a Shareable PDF so you can spread the word about the handful of technologies that are ready for primetime.

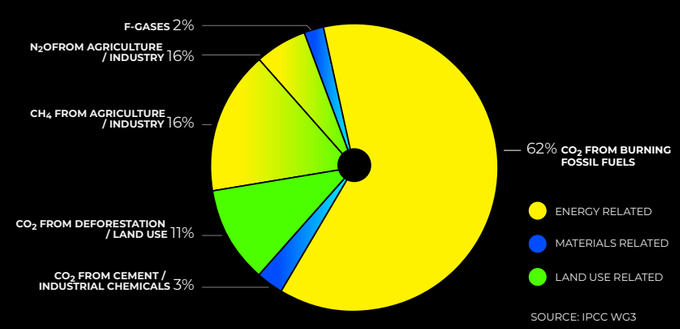
After all, the success of this campaign depends on your willingness to share it widely, and your help to ignite a movement that can condemn combustion to the past.

Time is arguably the most precious resource of all, and we have precious little left to avert disaster on an unimaginable scale. So please act as quickly as you are able, and use your voice to encourage others to do the same.

Robert Llewellyn and Dan Caesar
Joint CEOs
FULLY CHARGED

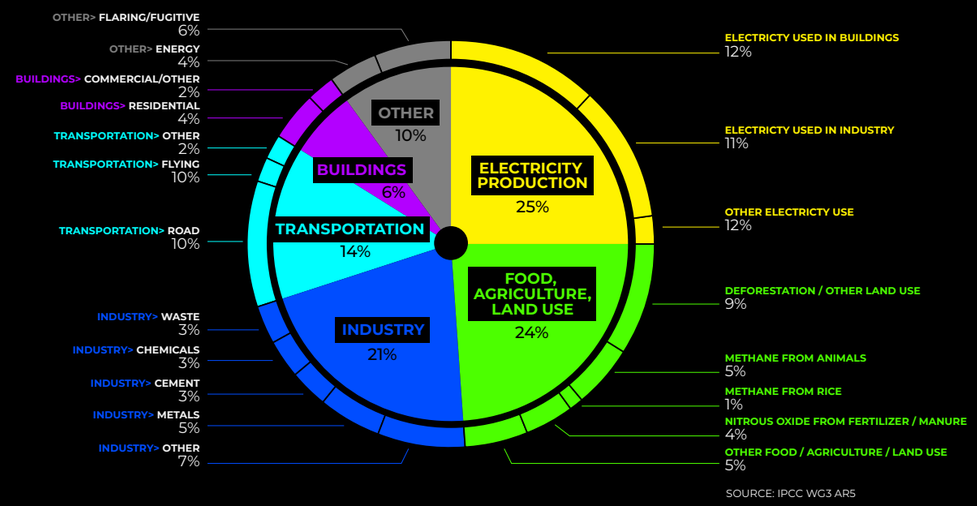


Source: Project Drawdown's 'Climate Solutions 101'



GREENHOUSE GAS SOURCES

*The combustion of fossil fuels is by and far and away the biggest cause of global heating.

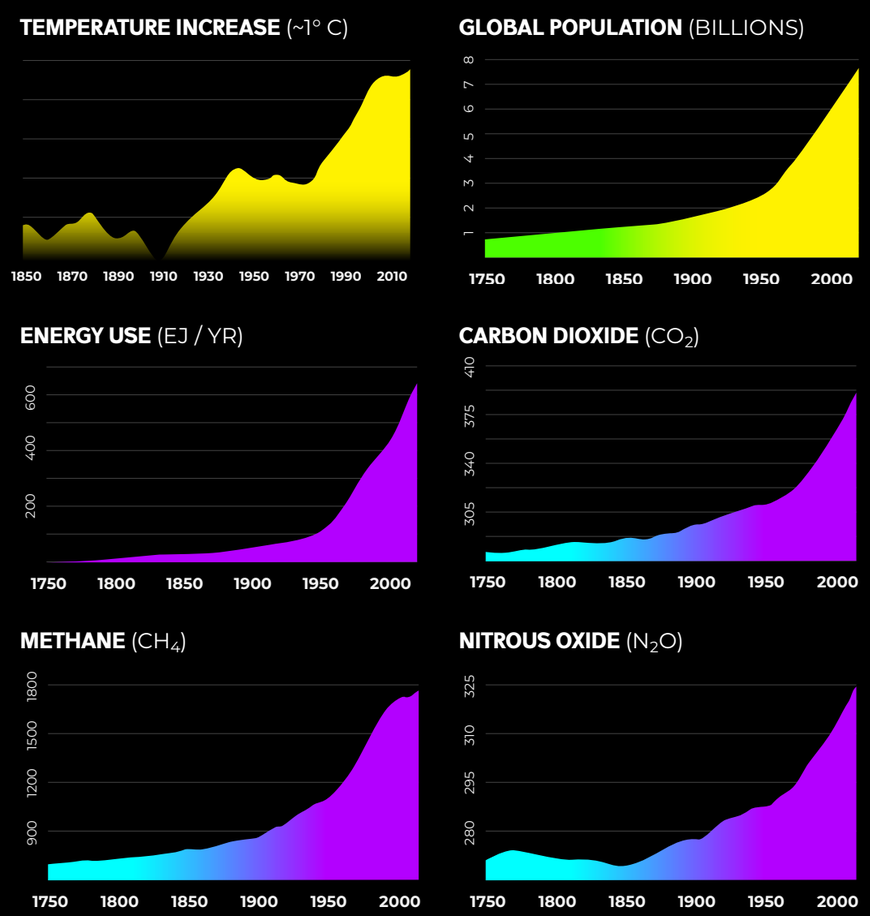


THE PROBLEM.

The air might not be clear, but the consensus is. Climate change is an existential threat to humankind. And it's not only the loss of life that should scare us, but the loss of a way of life we are accustomed to. Recent events have shown that simple shortages of consumer items can make life profoundly uncomfortable. Imagine then the 'discomfort' that drought, famine, conflict and mass migration could cause. All of these are already happening of course, and are set to intensify as the climate crisis takes hold. And what of the tipping points that are poorly understood? If you are not alarmed, you should be. We live in an increasingly volatile world, and without urgent intervention, a deteriorating situation could spiral out of control.

The good news though is that we know what the principal cause is - carbon emissions - and we have the technologies to avert this crisis, if we act decisively. There is more than one way to 'turn off the tap' when it comes to pumping pollution into the atmosphere, from dramatically reducing meat consumption to drastically rethinking consumption of products, but the single biggest difference we can make is to use renewables and energy storage to 'electrify almost everything.' In this, our #StopBurningStuff manifesto, we focus on the solutions to the biggest challenge humanity has ever faced.

CLIMATE



Source: Project Drawdown's 'Climate Solutions 101'

SOLUTIONS...

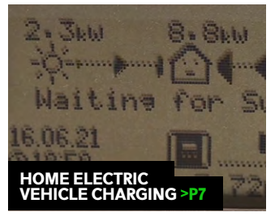
The problem with the potential solutions is that for those behind them, there are literal trillions at stake. So is it unsurprising then, that there are innumerable established players and prospective entrepreneurs claiming that their technology is the solution? It can be tough to know who to trust.

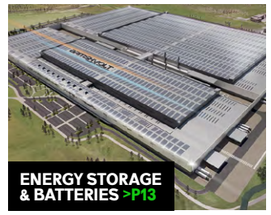
As an independent organisation, **Fully Charged** prides itself on its objectivity, and was established to explore the possibility of a post-combustion world. To that end, we exclude technologies that rely on burning stuff which includes coal, gas, oil, biomass and fossil fuel hydrogen.

Furthermore, for the purpose of this manifesto, we have excluded technologies that are as yet unproven, or undeployable at scale in the near future, such as nuclear fusion, green hydrogen, and carbon capture.

This enables us to focus on the 'today technologies' that can be deployed at scale now, and to showcase the pioneering countries, and companies that are making a difference.

While **Fully Charged** covers an array of technologies, these are the ones that we would like to see Governments actively accelerate during 'the climate decade':





MANIFESTO STATEMENT >P17

ELECTRIC CARS

60 Second Explainer

*When it comes to technologies that eliminate emissions, electric cars are often the poster child. And the great thing about 'pure' electric vehicles is there are no emissions at the tailpipe, because there is no tailpipe. What's more, whether it's by opting for a clean electricity supplier or generating your own power with solar panels, unlike their combustion engine counterparts, electric cars allow for the possibility that you can decouple from fossil fuel power plants, and are not simply moving the tailpipe elsewhere. What's more, the superior performance of electric cars has seen Norway race to pure electric - 77.5% of sales in September 2021 - and other car markets in China and Europe are following suit. So what about embodied emissions? The emissions that are used to manufacture the car in the first instance. Well, according to MiT (Massachusetts Institute of Technology), battery electric vehicles are already cleaner *, even when powered by the dirtiest energy grid, but with renewable energy, it is possible to clean up the carmaking process too.*

Disruptor Spotlight

"At Polestar we've been all-in from the get-go. Committed to driving change towards a climate-neutral future in a new era of sustainable electric mobility.

We want to be the change we know needs to happen and inspire the car industry to move in the same direction. That means improving, innovating, experimenting, and leaving no stone unturned in our ambition to create a future society that is climate-neutral, circular, transparent and inclusive.

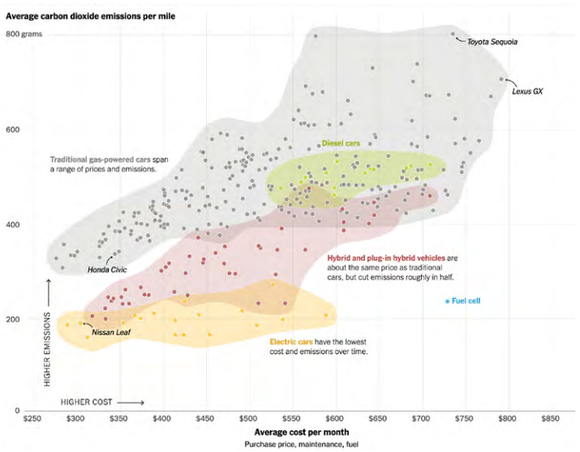
As part of our strategy of designing towards zero, we have set ourselves a moonshot goal: to create a climate-neutral car by 2030. This is the Polestar 0 project.

Our challenge will be to eliminate emissions from our supply chain and manufacturing processes, instead of relying on offsetting methods like tree-planting. Our goal is a car that leaves the factory gates with a zero-carbon footprint.

And in the name of transparency, we'll chart our progress between now and then, by introducing an industry first product labelling. Starting with Polestar 2, we will be disclosing the carbon footprint and traced risk materials, on the company website and in Polestar spaces. The labelling is something we aim to expand into including more sustainability indicators like recycled or renewable content.

We believe in being part of the solution, that progress should not come at the expense of the environment, and that good design drives sustainable innovation.

Today, all cars have an environmental footprint, but at Polestar we work relentlessly to minimise their negative impact on the planet and we aim to be fully transparent on the journey."



*Source: carboncounter.com by the MIT Trancik Lab | Note: The chart shows data for new cars, SUVs and other models that retail for $55,000 or less. The most fuel efficient trim for each car is included and additional trim levels are shown for cars over $35,000 if they have a lower fuel economy rating than other trims shown (they are less efficient) by at least 4 miles per gallon.

Polestar

SMALL ELECTRIC VEHICLES

60 Second Explainer

If the mission is #StopBurningStuff, then smaller electric vehicles are an incredibly important technology. If we are serious about reducing combustion, then replacing each and every car with an electric equivalent will not be enough. The world needs fewer vehicles, smaller vehicles, lighter vehicles, and more shareable vehicles, and that is another area in which electric vehicles excel. Whether it's a monowheel, a skateboard, a scooter. a bike, a moped, a motorbike or a trike, electrification is reinventing the wheels we travel on.

In the Netherlands for example, e-bike sales now account for more than half of all bike sales, and are responsible for liberating more individuals from cars and reducing carbon emissions too. Beyond cycling for pleasure or leisure though, perhaps the biggest potential decarbonisation gains can be made by replacing vans with last-mile solutions. In a world where we expect deliveries to come to us, the switch to small electrically assisted vehicles, can also reduce air pollution and congestion.

Disruptor Spotlight

"We are leading manufacturers of future transport vehicles, including last-mile and mid-mile solutions which are specifically designed for our evolving urban environments. Our products are zero-emissions, competitively priced, reliable and future-proofed. We are helping to solve the problem of efficiently and safely moving goods and people around the urban environment in a world where there's a rightfully heightened sense of awareness about climate change, air quality and health.

We are building sustainably engineered eCargo and lightweight urban platform vehicles for new use cases and new urban environments via EAV vehicles' unique ultra-efficient, lightweight, multi-modular solutions. EAV vehicles are based on LITE TECH™ engineering principles of achieving more with less. We're focused on reducing vehicle mass to save energy and achieving maximum efficiency performance value from our products which are fundamentally innovative in urban vehicle design.

EAV vehicles are sustainable by design, aesthetically harmonious and made from natural fibre composite materials and recycled plastics and metals. We manufacture our vehicles here in Oxford and locally source all of our materials and bought-in components where possible. Our bodywork and chassis are made on site, reducing our carbon footprint and maintaining our high sustainability levels.

We continue to validate our theory that urban environment transport can successfully change immediately having maximum positive effect on reducing climate change with no loss of efficiency or negative local economic impact. It is now the responsibility of those in Governments worldwide to make the bold legislative decisions to introduce changes without delay regardless of popularity but with greater focus on posterity."

eav

LARGE ELECTRIC VEHICLES

60 Second Explainer

When it came to larger vehicles, the assumption was that batteries wouldn't be up to the task, but that has proven to be false. The plummeting cost, and surging energy density of lithium-ion batteries in particular, has led to vehicle manufacturers of larger vans, trucks, buses, coaches, boats and trains to embrace electrification. Extraordinarily, even short-haul aviation is in the early stage of electrification with vertical take off and landing (VTOL) and inter-city flights showing particular promise. And while e-flight might be a few years away, larger electric vehicle markets around the world are well beyond the trial stage. For example, China is blazing a trail with more than 420,000 electric buses in operation already. While Europe is lagging behind South East Asia, it is home to a handful of leading organisations with big ambitions (and order books to match) for vans, trucks and buses.

6

Disruptor Spotlight

"The transport and logistics sector is a major element in the decarbonisation journey; in fact, so important is it that COP26 will dedicate a whole day to discussing the industry's contribution to the cause.

However, actions speak louder than words. Action that has been sadly lacking among the signatories of the Paris Agreement established at COP21 in Paris six years ago.

Traditionally fuelled trucks in Europe account for less than 2% of vehicles on the road, yet 23% of carbon emissions emitted from road transport. What we need are zero emissions, electric trucks on the road, not more targets.

Fortunately, the technology to electrify fleets and make a tangible and substantial contribution to improve air quality in city centre environments exists now in the form of the Volta Zero, the world's first purpose-built, 16t electric truck.

The Volta Zero is not a concept for the future, it is a vehicle that will start working on Europe's roads in a few months' time. By the end of 2023, 5,000 Volta Zeros will be in operation, scaling to 27,000 by 2025. While world leaders have been talking about change, Volta Trucks has been busy delivering it, journeying from design concept to first customer deliveries in just 2 years – unprecedented in the automotive world which takes on average 7 years to achieve the same.

By adopting this technology and electrifying their fleets now, fleet operators will deliver a significant contribution to COP26's net zero ambitions in a very tangible way. Given over 2,500 pre-orders of Volta Zero have been placed already, many businesses have already put the wheels in motion.

These businesses will also be playing a vital role in solving the industry's driver shortage issues and safety record; The removal of the internal combustion engine enabled a complete reimagination of conventional truck cabin

design principles, revolutionising safety and ergonomics for the driver, whilst also protecting vulnerable road users.

With a lower total cost of ownership than equivalent traditional trucks, a Truck as a Service proposition that simplifies the migration to electrification, and a ground-up design which revolutionises safety, the Volta Zero is more than just an electric truck. It's a vehicle for change."

VOLTA TRUCKS

HOME ELECTRIC VEHICLE CHARGING

60 Second Explainer

Despite what you might be led to believe, it is possible to enjoy owning an electric car even if you do not have a home charger. Local charging hubs at retail destinations and traditional forecourts are becoming increasingly commonplace, as are on-street pop-up chargers, lamppost chargers and even 'charger sharing' apps are catching on. Add that to the fact that with longer range electric cars (200-300 miles), surveys show that the average electric car only charges once or twice a week; not every night as one might reasonably assume. All that said, waking up with a 'fully charged' car is a luxury, and smart home chargers that draw power from the grid overnight when it is at its cheapest, are an affordable luxury. The best smart chargers can offer an array of functionality, and you can benefit from charging modes that utilise the electricity from your solar PV or from wind generation, and which tie all of your energy devices together into a single, informative app.

7

Disruptor Spotlight

"myenergi are leading innovators of Electric Vehicle Charging Products and Integrated Eco-Smart Technology Solutions.

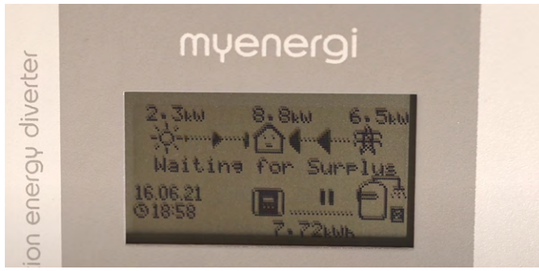
Headquartered in Grimsby, North-East Lincolnshire, we are proud to design and manufacture all our products and software from the ground up, right here in the UK, supporting the economy, local jobs, and putting British innovation and technology back on the world stage. America has Silicon Valley, but right here on our doorstep we have the Humber Estuary, a super cluster zone for renewable innovation companies, for which myenergi are at the heart of.

Proud pioneers of the world's first solar and wind compatible electric vehicle charger, zappi, we have subsidiaries based in Germany, Benelux, Northern Ireland, Australia, with ambitions to open more facilities right across the world.

The ability to charge through 100% self-generated energy and off grid, has always been at the forefront of our product design and innovation, releasing pressure from the grid system. We have taken our time in making sure our products are truly smart and we believe being smart is far more than just the ability to connect to the internet, but equally smart in its planet saving features, how it can save customers money, and integrate with other renewable technologies coming to market.

zappi has been carefully designed to include several features and functions to give users complete control of their electric car charging experience, such as the ability to utilise time of use and economy tariffs, allowing users to schedule chargers at times when energy tariffs are at their lowest, thus encouraging energy consciousness.

Not only do we design our products for the complete user-friendly experience but equally with the installation process in mind. Reducing face fix cabling and the need to reduce disruption to existing buildings was an



important factor in the product design process. Our harvi product is an energy monitor which transmits import / export data to the other myenergi devices every 1 second completely wirelessly and negates the need to run wired CT clamps between devices. Our hub product ensures all myenergi devices are connected securely to the internet and allows users the ability to monitor and control their devices remotely through the myenergi app.

This truly British product was also designed with safety as a top priority, setting the standards, with its patented built-in PEN fault technology and RCDs, making it the safest choice for an electric car charger, eliminating the need to install additional earth rods allowing easy installation and no extra costs."

myenergi

REMOTE ELECTRIC VEHICLE CHARGING

60 Second Explainer

Another well-worn assumption, is that it is difficult to charge an electric car on a longer journey. As high mileage electric car drivers will testify, the infrastructure is much more advanced than most realise, and is being built out at an incredible rate.

In the UK, there are now more than 26,000 chargers, with hundreds being installed each and every month. While there are exceptions to the rule, chargers are typically under-used, or at least not at capacity, so there is headroom for more electric cars, even if the infrastructure wasn't expanding. What's more, rapid chargers, as well as becoming more commonplace, are becoming faster too. The latest models from Hyundai (Ioniq 5) and KIA (EV6), both built on the same platform, have the capability to charge from 10% to 80% in an impressive 18 minutes. If there was a weak spot in the UK's infrastructure it was around strategic motorway and main route charging hubs, and this is currently receiving a comprehensive overhaul.

Disruptor Spotlight

"If we want drivers to relinquish their 100-year love affair with the internal combustion engine and switch to electric vehicles (EVs) before the end of the decade, we need an EV charging infrastructure in the UK that is plentiful, robust, reliable and affordable. We also need to create an experience that is fundamentally better than the one it replaces, encouraging people to make the switch because they want to and not because somebody is telling them they have to.

The GRIDSERVE Electric Forecourt® represents the most advanced piece of charging infrastructure anywhere in the world and can only be described as a filling station from the future. One that doesn't just supply an abundance of EV chargers powered exclusively by renewable energy, but provides a vital hub for the local community it serves with office pods, exercise bikes, an exhibition space, coffee shop and Post Office. Indeed, every one of the 100 Electric Forecourts® we have committed to build within the next five years will be designed specifically to meet the needs of its local area.

It is our hope that infrastructure like this breaks down any perceived barriers and changes the conversation around EVs, particularly for the estimated 40 per cent of households who don't have the ability to charge at home. And our commitment to delivering a charging infrastructure that works for everyone goes further, both with the rollout of our high power Electric Hubs, as seen in Rugby, and the complete upgrade of the recently acquired Electric Highway."

GRIDSERVE sustainable energy

SUSTAINABLE ENERGY SUPPLIERS

60 Second Explainer

While the UK energy supplier market is undergoing a live 'stress test' as a result of surging gas prices, the opening up of the market over the last decade has generated some sorely needed competition. Whisper it quietly, but there's a sense that Britain is becoming a 'silicon valley' for energy disruptors, and other nations are looking to learn lessons and in some cases import our know-how into their energy markets. Since 2012, the UK has successfully pushed coal-generation off the power system, with wind power as the biggest beneficiary, and solar power as the biggest surprise. Despite this progress, fossil fuel energy generation still predominates, with gas as the largest single source of power (37.36% in 2020) and around four fifths of heat usage. Sustainable energy suppliers that turn 'bills into windmills' or build solar farms, agile disruptors that create new tariffs and reinvent the energy system, have already proven to be hugely successful.

Disruptor Spotlight

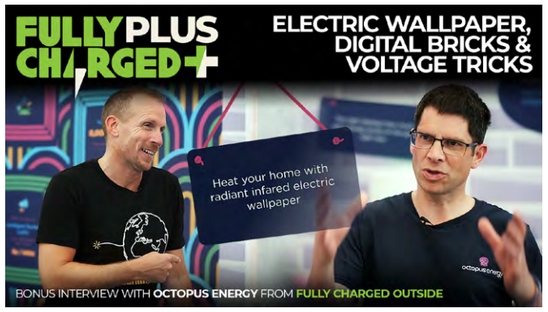
"As a green energy supplier, our job is to help make the UK's power 100% green as quickly as possible and help our customer's reduce their energy carbon footprint to zero. Not only do we ensure all the electricity we supply is green, we're also investing in renewables and technologies to drive system-wide change and end the UK's reliance on fossil fuels once and for all!

We ensure that we are 100% green by making sure that for every electron we supply from the grid, we invest in the generation of another 'green' electron to take its place. Whether that's through REGOs or Power Purchase Agreements with over 120 green producers in the UK.

On top of this, we're also one of the biggest investors in renewable power in Europe, managing 300+ UK green energy producers.

Last year, this was enough to power over 1.2 million homes. We plan on making that 50 million homes worldwide by 2027.

We believe in forging deep connections between communities and their green power. That's why we buy green power from nearly 100 small community-run energy cooperatives – where locals own and run their own power, and profit is reinvested in local charity or environmental initiatives. It's why we pay thousands of Brits a fair price to generate solar power at home. We even give some local communities cheaper power when our wind turbines are spinning through the Octopus Fan Club."



octopus energy

WIND POWER

60 Second Explainer

If there is one sector where the UK is especially resource rich, it is in terms of the wind it can harness. While on-shore wind is cheapest of all, with 11,023 miles of coastline the British Isles is incredibly well positioned to benefit from off-shore wind. In 2020, wind power represented 21.56% of Britain's electricity supply, with 67% as a target by 2030 as turbines get cheaper, larger and increasingly efficient. To put this progress into context, the next generation turbine coming out of China, is a 16 MW monster. At 242 metres in height, it can power 20,000 homes. And while a wind turbine's life cycle is rated as 25 years, there are now companies that are pioneering the recycling of the difficult to dispose of blades. While the accelerating deployment of wind power is an economic inevitability, the UK would do well to grasp this technology with both hands by making it easier to build on-shore turbines too.

10

Disruptor Spotlight

"Ripple has reinvented green energy ownership. We enable you to part own a large scale wind farm and have the green, low cost electricity it produces supplied to your home via the grid.

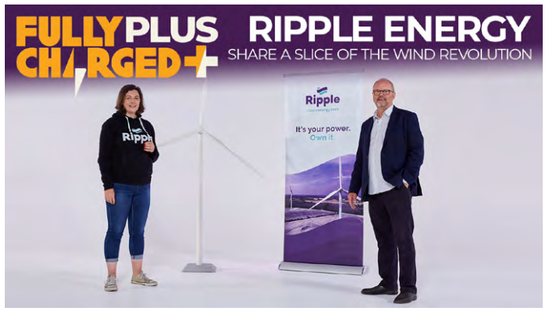
Ripple is the new way to make a big, long term climate impact. It can also reduce your electricity bill by around 25% and help stabilize it for the long term.

The UK's first consumer owned wind farm, facilitated by Ripple, is currently under construction in Wales. It is due to begin supplying its 900 owners with green, low cost at the end of 2021. Ripple is now gearing up to launch a second, much larger wind farm in January, able to supply thousands of households. Ripple is part of the NextGen offshore wind consortium so in a few years you'll be able to own a bit of an offshore wind farm too!

Ripple's revolutionary platform makes clean energy ownership simple. Just buy as much of the wind farm as you want, and let Ripple take care of the rest. We've partnered with Your Co-op Energy, powered by Octopus Energy, and have more suppliers joining our pool shortly. Your supplier supplies your electricity, from your wind farm, to your home and the savings are applied to your bill each month.

Reservations for our second wind farm are now open ahead of the launch of the ownership co-op in January.

It's your green power. Own it."



Ripple

COMMERCIAL SOLAR POWER

60 Second Explainer

Alongside Wind, Solar is the cheapest form of energy available across the world. At the end of 2020 China had a total installed photovoltaic capacity of 253GW - 250GW more than in 2010 - and intends to double its capacity by the end of the decade. This will further drive down costs, and additional efficiency gains are anticipated too. Even the UK, a nation not synonymous with sunshine, generated ~5% of its power from solar, but it is true that countries in sunnier climes are set to be the biggest beneficiaries of the solar economy. While solar farms are well-established in the UK, and elsewhere, and are leading to the development of 'agrivoltaics' - co-developing land for solar power and agriculture - there is even more fertile ground for this technology in commercial rooftops. 'Big box' solar - that's solar on top of superstores and shopping centres - is one of the greatest untapped resources in countries like the US, UK and Australia.

11

Disruptor Spotlight

"There has never been a stronger imperative to remove our reliance on fossil fuels to power our industries, heat our homes and fuel our cars. Fortunately, we now stand on the cusp of a renewably powered revolution whereby the economics are more favourable than traditional, more polluting alternatives.

Our mission at GRIDSERVE is to deliver sustainable energy at such a scale that it can move the needle on climate change. To do this, we have developed a proprietary 'sun-to-wheel' energy model that harvests the earth's most powerful renewable energy source, both to help stabilise the grid and support our emerging network of high power EV charge points. Our zero carbon Electric Forecourt® in Uckfield opens in 2022 and, thanks to its adjacent hybrid solar farm, will provide a living, breathing demonstration of our entire sun-to-wheel ecosystem on one site.

Within the last 20 years, we've seen the cost of solar PV fall by 90 per cent which, combined with the low levelized cost of electricity (LCOE), has encouraged the development of increasingly large-scale solar farms. GRIDSERVE's hybrid solar farm in York, for example, is a 200-acre site that features 90,000 bifacial solar panels and develops 40GWh of zero carbon energy; that's enough to power a small town. Better still is the knowledge this energy could give that same small town control over its energy prices, contribute towards reducing fuel poverty and tackle the climate emergency. A better and more sustainable future is now in reach. We just need to deliver it."

GRIDSERVE sustainable energy

HOME SOLAR POWER

60 Second Explainer

Rooftops from Brisbane to Bavaria have seen a huge surge in solar panel installs, and even in the UK there are around 1 million homes with mounted solar panels. This extends beyond solar PV for electricity to solar thermal systems for hot water in particular. As costs continue to fall, uptake is expected to continually increase over the next two decades. The synergy between being able to charge your EV (electric vehicle) from your PV (photovoltaics) is becoming clearer, and the growth of each market will be mutually reinforcing. Arguably the most interesting development, that is likely to positively affect solar sales, is the improving aesthetics of PV. Whether it's integrated solar that is flush with the roof tiles - rather than on a mounting system - or solar roof tiles instead of a traditional roof, the future is bright for solar. Eventually, even new build house developers will succumb to the inevitability of solar economics

Disruptor Spotlight

"Integrating solar panels and renewable energy sources onto UK homes is going to be vital in tackling our nation's carbon footprint. However, utilising that self-generated energy efficiently and cost effectively must also be considered to make it an attractive proposition for consumers, who may be concerned by upfront costs and return on investment.

Technologies such as battery storage, air source heat pumps and domestic turbines will all play their part in reaching our carbon neutral goals. Installing these technologies into buildings is one thing, but the smart integration element of these technologies harmoniously working in conjunction with each other is another.

This is where myenergi's integrated eco-smart home product range fills the gap in the market, including our original flagship product eddi, which ultimately provides a brain to any solar PV and renewable home setup. eddi is a micro-generation energy diverter, designed to maximise the utilisation of surplus generated green energy, which traditionally filtered back onto the grid.

This product works by diverting any surplus un-used energy back into the home, to instead heat water. It is most commonly used in conjunction with immersion heating systems, underfloor heating, swimming pools or practically any resistive load.

In allowing users to utilise their surplus green energy, we are ultimately reducing reliance on the grid and providing users with energy independence.

As we move towards the electrification of vehicles, providing zero emission transport also brings about the challenge of reducing extra strain on the grid.

The notion towards implementing eco smart technology in new homes as standard will provide another way in which we can remove the need for burning coal, and thus reduce strain on the grid.

myenergi's integrated wireless technologies such as harvi and hub will be beneficial in implementing these vital elements into existing homes, by making it very easy for installers by reducing difficult cable routing, making for quicker and easier installations.

This seamless control and monitoring eco-system between all myenergi smart home products, combined with the potential return on investment benefits is totally unique in the marketplace."

myenergi

ENERGY STORAGE & BATTERIES

60 Second Explainer

Long heralded as the 'holy grail' of energy, the energy transition has gone into high gear since lithium-ion batteries became commercially viable. Would Tesla have been able to prosper without the rapid cost reduction, and impressive density improvements of the lithium-ion battery? And of course, that influence goes beyond battery electric vehicles, to 'powerwalls' in properties, and 'powerpacks' on a commercial scale, not forgetting large-scale storage like the Hornsdale 'Big Battery'. But the 'battery' revolution is not limited to lithium-ion, and not restricted to Tesla. Energy Storage takes a myriad of forms, and the abilities of technologies like pumped hydroelectric, compressed air, flywheels, thermal storage, sodium-ion batteries, and in the near future, lithium-ion phosphate and solid state batteries, means that the energy storage insurgency is still only in its infancy. It's becoming clear that the nations that manufacture batteries will have huge strategic advantage.

Disruptor Spotlight

"Britishvolt is the trusted battery cell partner of the energy transition. As we race towards net zero, Britishvolt will create opportunities through thoughtful collaboration with the existing world-class UK battery ecosystem. This ecosystem was created by the foresight of the UK Gov.

By partnering with the likes of WMG [University of Warwick], Faraday Institution, Advanced Propulsion Centre and UKBIC, Britishvolt has been able to speed up its journey to industrialisation and really hit the ground sprinting. Its mission is clear, to deliver low-carbon, sustainable, responsibly manufactured battery cells to accelerate the transition to a net zero future.

Britishvolt's advanced-manufacturing facility will be based on the former coal stocking yard of the Blyth Power Station in Cambois, Northumberland. A true Phoenix from the flames. The site empowers the "levelling-up" agenda and will create upwards of 3,000 direct skilled jobs and 5,000 in the associated supply chain. The company aims to re-shore industry, co-locate business and equip Global Britain for the next industrial revolution, what some call the Green Revolution. Britain has the opportunity to be at the very vanguard of this transformation, and Britishvolt is proud to be an important part of the start of this new chapter.

Britishvolt is home-grown, sticky intellectual property that will truly place the UK at the very heart of the energy transition and battery industry. A company with ESG at its very core, with facilities powered by clean, renewable energy. A flagbearer of sustainability. Britishvolt is the design, development and commercialisation behind the battery cells that will power the world's electric vehicles. BV, proudly British, passionately global."

BRITISHVOLT

HEATING & HOT WATER

Disruptor Spotlights

Air Source Heat Pumps

"Decarbonising domestic heating is vital to achieving Net Zero. That's why we've invested £10m in our pioneering Electrification of Heat R&D centre to make heat pumps a "no brainer" replacement for a gas boiler.

Our 24,000 ft centre is the home for all our heat pump research & development, where we develop new innovations to deliver heat pumps to more homes at a fraction of the cost. It's also the base for our army of green heat engineers to practise installations on real life homes and find new ways to streamline the installation process.

Through research, development and continuous process improvement, we've already been able to significantly reduce the cost of heat pumps, improve the installation experience and increase the number of homes which can be heated comfortably, affordably and sustainably through electricity.

By the time the government's Heat and Building strategy fund launches in April 2022, we will be able to offer heat pumps at an equivalent cost to gas boilers. And we've pledged to train 1,000 heat pump installers a year through this centre – doubling the UK's current capacity.

We're also working hard to drop running costs, by developing dynamic pricing tariffs such as Agile Octopus and smart controls to automatically run their heat pump in the cheapest, greenest periods, saving up to 30% on their energy bills."

octopus energy

Ground Source Heat Pumps

"To reach the 600,000 heat pump installations required by government per year by 2028, we require mass adoption. To achieve this, Kensa's vision is networked ground source heat pumps; a scaleable, street-by-street approach, with individual appliances in each home connected to a separately owned, funded and maintained underground infrastructure, mimicking and replacing the gas grid approach. Introduce into this model smart controls, flexible tariffs, and the use of waste heat, and you have the lowest cost heat decarbonisation pathway that supports the electrification transition. Kensa's 'Welcome to Green Street' augmented reality experience, unveiled at COP26, epitomises this optimum energy solution to affect change.

An early adopter of this mass-scale, future-proofed, low carbon heat solution, is the award-winning Core 364 project delivered by Kensa Contracting, Gentoo and Engie. A #StopBurningStuff pioneer, this project is the largest gas replacement programme to feature ground source heat pumps in tower blocks.

Residents in 364 flats over seven blocks in Sunderland made the switch from individual gas boilers to individual ground source heat pumps coupled with Sunamp heat batteries.

Each Kensa Shoebox heat pump – one per flat – is connected to an ambient loop transferring heat from the ground to each flat. The ambient system maintains high efficiency by preventing heat losses and also avoids overheating in communal areas. An underground aquifer provides the natural heat source for the ambient loop to make up a fifth generating district heating system for the tower blocks.

The heat pumps provide residents with heating independence and the freedom to switch energy suppliers, whilst reducing carbon emissions by an estimated 420 tonnes per year or nearly 70% and improving local air quality. As the grid further decarbonises, the carbon savings will become more pronounced."

Kensa Heat Pumps
A KENSA GROUP COMPANY

60 Second Explainer

Heating has been the 'elephant in the room' for some considerable time, it's a complex problem, and until now there hasn't been sufficient urgency on this topic. However, with the irreversible tip to electric vehicles, and a sustained surge towards sustainable energy, hard to tackle heating now needs to be tackled head on. Hydrogen has been touted as a potential solution, but 'green' hydrogen in the quantities required is not a realistic prospect in the next decade, as such it will be down to electrification to do the heavy lifting when it comes to heating and hot water. The coefficient of performance that heat pumps offer - air source being ~3 times, ground source being ~4 times more efficient than gas boilers - means that this technology will play a huge part to decarbonise homes and buildings. But the swiss army knife of electrification, offers an array of options from zero emission boilers, to infrared heating, aided and abetted by thermal storage, will be critical.

Zero Emission Boilers

"tepeo's invention, the Zero Emission Boiler (ZEB®), is designed to tackle the UK's biggest challenge to reaching Net Zero: rapid, easy and low cost decarbonisation of domestic heating. The ZEB is a low carbon, cost-effective "plug 'n' play" replacement for a fossil fuel boiler. It matches the high temperature and power performance of conventional fossil fuel boilers, but is powered by electricity. It uses ultra-high density thermal storage technology to decouple heating demand from electricity consumption. This enables tepeo's cloud-based algorithms and machine learning to ensure each device uses only the cheapest and greenest electricity.

Installation causes minimal disruption to people's homes and the overall proposition is a compelling and affordable alternative to heat pumps or hydrogen boilers. The ZEB® will drive rapid decarbonisation of domestic heating through electrification while also supporting more renewable generation on the grid through Demand Side Response and flexibility. Last year the National Grid spent over £280m on curtailing wind generation - devices like the ZEB will play a huge role in reducing and hopefully eliminating this wastefulness. ZEBs also independently monitor the needs of the electricity grid in real-time and can react almost instantaneously to support services like frequency response.

tepeo has run domestic trials over the 2020/21 heating season which have been a huge success. The units proved they were able to deliver the full heat demand of the trial homes in place of their previous boiler. The company is now ramping up to sell the first units by the end of 2021."

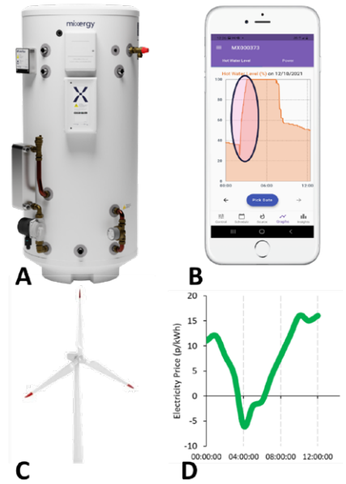
tepeo

Thermal Storage

"The Mixergy tank is a novel hot water system which only heats what you need by exploiting the physics of thermal stratification. This halves the heat losses when compared to a conventional system whilst being up to 5 X faster at achieving a useful temperature from cold. Each tank has a sensing arrangement so that the household has visibility of how much hot water they have available at any given instance from their phone. This connectivity allows the Mixergy tank to store surplus renewable energy from the grid whenever there are surges of wind power or solar energy.

Mixergy are being installed throughout the UK via one of Europe's largest installer force, British Gas. Our collective fleet of Mixergy tanks are now delivering a virtual battery facility for the UK's National Grid in partnership with Centrica. Today, we are delivering up to 2.6MW of flexible power consumption depending on the amount of wind or solar power on the system. At the same time, we are delivering cost savings of up to 40% for the householder alongside grid carbon reductions in excess of 15%. Every tank is ready for a heat-pump install in the future and comes with a 25 year warranty making each system ready for the transition to net zero today.

Across Europe, there is the equivalent of 7 Giga-factories of energy storage production associated with hot water tank manufacturing without the environmental footprint associated with Lithium-Ion batteries. Mixergy's ambition is to harness this potential for a cleaner grid!"



The Mixergy tank (A) looks like a conventional hot water cylinder but is capable of heating only what you need through a novel stratification system saving energy and carbon for the household. At the same time, we connect to a mobile app (B) where the state of charge is visible at all times. This connectivity allows us to store surplus renewable energy (C) which can result in negative electricity prices (D)

mixergy

ENERGY EFFICIENCY

60 Second Explainer

Energy efficiency has suffered from its own invisibilty, but of course the cheapest energy, is the energy that you don't use. Insulation might not seem scintillating, but it is absolutely essential in the UK, the country with the leakiest housing stock in Europe. Above and beyond a 'fabric first' approach, we must get to grips with energy usage, wherever we go there is an incredible amount of waste, and you don't necessarily need a smart meter to confirm that. In buildings, especially domestic dwellings, mandating smart thermostats should be considered. There are a range of other cheaper measures to consider from LED lighting, to Wi-Fi enabled smart plugs and from voltage optimisation to aerated shower heads, but the biggest gains relate to wasting the expensive energy that it takes to heat space and water. If anything this should, in the majority of buildings, be the logical place to start, after all 'the journey of a thousand miles, starts with the smallest steps.

MANIFESTO STATEMENT

What is our objective?

We would like humanity to #StopBurningStuff to fuel our lifestyles and to significantly reduce its overall contribution to global greenhouse gas emissions.

Who needs to take action?

Everyone of course, but especially people 'in power'. We believe that citizens across the world would like to take positive action, but that our leaders at a political level need to be much, much more proactive.

What actions need to be taken?

International, national, regional and local leaders need to use their powers to strongly legislate in favour of, and significantly incentivise, the following technologies AND to disincentivise fossil fuelled technologies:

- ***Electric Cars***
- ***Small Electric Vehicles***
- ***Large Electric Vehicles***
- ***Electric Vehicle Charging***
- ***Sustainable Energy Suppliers***
- ***Wind Power***
- ***Solar Power***
- ***Energy Storage & Batteries***
- ***Electric Heating & Hot Water***
- ***Energy Efficiency***

This will enable us to keep fossil fuels in the ground, and stop burning them to air, poisoning the atmosphere and exacerbating the climate emergency.

We believe that the single most effective way to achieve these goals, and to enable the world to #StopBurningStuff, would be to remove all subsidies for fossil fuels.

THANKS TO THE KIND CONTRIBUTIONS FROM:

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*Make a positive impact, share the **#StopBurningStuff Première** and this manifesto with your friends, family and with the people who have the power to make a difference.*