

Electrification by Design

The case for proven low carbon technologies and system flexibility for our low carbon future

The IPPC climate change report marks a critical point in our history, Green GB Week is the start of a dialogue business should now be having with Government on how we are to decarbonise and drive investment.

As an industry we recognise this urgent need for radical change, and here we lay out our commitment as a supply chain to deliver the low carbon and intelligent technologies required for our green future. We strongly believe there is a lot more that can be done through appropriate policy and regulation to make the most of proven low carbon technology.

The Energy System Challenge

Our electric future will mean replacing fossil fuels with electricity on a wide scale, including for transport (private and public, passenger and freight, road and rail and, eventually, aviation) and heat in buildings. We also need to rapidly decarbonise electricity generation, replacing old carbon intense plant with distributed energy and centralised plant that allow our energy-related carbon emissions to approach zero. This means much greater reliance on renewable electricity generation, so we need to develop a flexible and optimised energy network to cope with shifts in supply and demand.

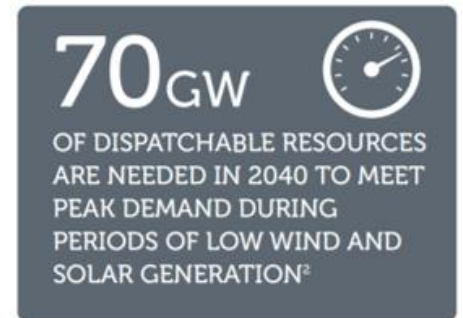
There has been no shortage of policy initiatives along the way, from the all-important smart meter rollout through to regulated investment via the Low Carbon Network Fund, other Government initiatives to promote localised electricity generation, renewable heat and energy efficiency, and sustained grant support for electric vehicles. As well as decarbonisation, the Government has identified other reasons to increase the proportion of electricity in our energy mix. For example, there is now a commitment to address air quality by switching high emission vehicles to electric equivalents and phasing out new petrol and diesel vehicles.

BEAMA published [the Electrification by Design Series](#) in 2018 and with Clean Growth high on the UK agenda, the call to action is clear. We now call for the highest level of ambition from Government and Industry to deliver this.

Report Highlights:

#Energy Storage by Design

- ✓ Government and the regulator need to encourage new market models and applications for storage and other technologies to fully realise the benefits and value that storage offers to consumers and the energy system
- ✓ Industry needs to be in a position to influence consumer choice and ensure that markets and propositions are available to consumers for storage and other low carbon technologies.
- ✓ Falling costs of lithium-ion batteries make battery use economic for a range of applications, from end-user storage to reducing peak system requirements. We need to enable the formation of markets for storage at domestic level and develop regional market mechanisms so energy prices reflect the network constraints that DSR is best suited to solving.



#Electric Transport by Design

- ✓ The electrification of road transport is a critical aspect of the broad, nationwide changes that will occur over the coming decades as we transition to a low-carbon economy with smart, responsive and flexible energy systems. As the market expands, the cost of EVs and smart home products will fall and interactive services and demand-side price signals will bring new value to consumers. It is essential that consumers retain confidence in the value for money of smart controls, and that the upstream beneficiaries of smart data management pass on savings in an equitable and transparent fashion.
- ✓ We should target smart tariffs to promote growth of EVs and other low carbon technologies and develop services that allow consumers and third parties to access new revenue streams in exchange for shifting charging behaviour
- ✓ As the market for clean transport grows and develops, some technologies will flourish while others will remain niche or disappear altogether. It is important that the industry responds effectively to new products and systems to make the consumer experience simple and stable even while the market changes at pace.

#Smart Homes by Design

- ✓ The key to our low carbon future is consumer confidence in smart appliances and IOT devices, which means
 - Interoperability
 - Cybersecurity
 - Affordability and realisable benefits (not just marginal energy savings; we need to reward consumers for providing flexibility to the grid)
 - A customer journey that allows consumers to start small and tailor their system(s) to their changing needs.

- ✓ The smart home is enabled by smart metering, which gives consumers more information about their energy use. Smart building energy management can also help people take control of their energy use, but it can do so in a different way: not necessarily by giving them more information but by helping them manage it more efficiently.
- ✓ Most consumers won't get a smart home energy management system so they can spend more time thinking about their energy use; they'll do it so they can spend less. So innovative service packages will emerge to manage the complexity for the consumer, using AI (machine learning, or intelligent automation) to respond to dynamic price signals and get the best price for energy.

#Electric Heat by Design

- ✓ The growth in renewables on the energy system results in all electric heating technologies becoming decarbonised at point of use, making them more favourable than higher carbon alternatives – including gas – from the perspective of climate change policy.
- ✓ The only proven route for heat decarbonisation in the lead up to 2030 is electrification and investment in heat networks in suitable areas. Heat pumps and smart electric thermal storage products have been successfully installed in the UK and around the EU, and while investment into the potential for biofuels and hydrogen gas may change the picture beyond 2030, we need to act now to promote growth in heat pumps and heat storage technologies to seriously address heat decarbonization.
- ✓ The Government's Clean Growth Strategy¹ lays a vision to 2032, but as an industry we look to 2030 as the Climate Change Committee made it clear that we will need 2.5m heat pumps installed by 2030, with progress to 300,000 by 2020. Policy initiatives should particularly focus on new-build, in addition to extending, strengthening and aligning current incentives for the retrofit market (e.g. RHI and ECO).

The Facts!

Once perceived as a high carbon fuel, electricity has been on a decarbonisation journey that has seen the carbon content plummet from around 0.519kg CO₂/kWh in 2009 to value of 0.233 kgCO₂/kWh published in the provisional SAP 10.0 specification². With a rapidly changing generation mix, the actual CO₂ content is regularly below 0.250kg CO₂/kWh. According to Government data³ in 2017 electric heating will have been more carbon efficient than gas heating (assuming 100% system efficiency for electric heating with an emissions intensity at 0.212kg CO₂/kWh versus 85% gas heating system efficiency with an intensity of 0.184kg CO₂/kWh). Similarly, a heat pump only needs to have an annual COP of 1.1 to be more efficiency than gas heating (using the SAP 10.0 carbon factor for electricity for 2018-2020 and assuming 85% gas heating system efficiency with an intensity of 0.184kg CO₂/kWh). Based on these calculations, it is easy to see how SAP 10, once implemented, is likely to have a significant impact on the specification of heating systems for new-build .

¹ BEIS – The Clean Growth Strategy: Leading the way to a low-carbon future (2017)

² BRE – Consultation for CO₂ and Primary Energy Conversion Factors for SAP 10.0 (June 2016) The Government's Standard Assessment Procedure for Energy Rating of Dwellings Version 10.0 (SAP 10.0)

³ BEIS – Updated Energy and Emission projections (2017)

#Flexibility by Design

- ✓ There are many forms of flexibility and they all need their own market design, and these will become viable at different times. Introducing locational and ½ hr time of use network charging will be essential to unlock the value of residential flexibility in response to network constraints.
- ✓ Although there is lots of interest in flexibility, data shows that the market drivers are weak at this time as electricity demand has fallen with greater energy efficiency. This provides an opportunity to roll out services as the need for flexibility grows. The growth in EVs is likely to be a major driver, and that will enable us to rollout wider services for all smart appliances as needed. As more renewables come onto the system, the need for flexibility will grow and we should be ready for this.
- ✓ In recent years our Network Operators have been incentivised to trial different methods of flexibility, and considerable investment for innovation in new smart systems, services and technologies has been made. This has proven new use cases for services and technologies that will enable flexibility and we should now be focusing on ensuring investment continues in these beyond the trial, and form part of the network company's business strategies of the future. We should also allow new market entrants to facilitate flexibility services (e.g. aggregators, storage and flexibility operators)

We recognise that Government has significant challenges in balancing the need for urgent action to decarbonise, with acceptability to consumers and businesses. Recent actions such as the continuing fuel duty freeze, and a price cap that does not deliver the same savings as would investment in energy efficiency technologies⁴⁵, indicate a particular direction from the Government that does not seem as radical as the recently published IPCC report deems necessary. Industry also see a lack of ambition in some incentives to drive the uptake of low carbon technologies (e.g. Energy Company Obligation), which are still supporting high emission solutions.

BEAMA support successive and sustained energy supplier schemes and progressive building regulations to tackle the challenge in our built environment, and opportunity exists for UK Government to make some significant improvements here – supported by the Prime Minister's mission to half energy use in buildings and drive the uptake of electric vehicles.

BEAMA make a continued commitment to support UK Government on delivering their Clean Growth Strategy and Smart Flexibility Plan, and call for radical change to enable the opportunities our industry helping to achieve.

⁴ <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

⁵ <https://twitter.com/janrosenow/status/968063203988180992>

Notes to Editors:

About BEAMA

BEAMA has been established for over 100 years, covering a range of industries in the electrical, energy, water and power related sectors.

BEAMA exists to support its members in ensuring that the UK has a strong electrotechnical industry which is recognised as an essential part of modern society and brings invaluable economic, social and environmental benefits. It represents directly some 200 companies in the UK electrotechnical and allied manufacturing industries advising its members on relevant technology and market developments, particularly relating to the areas of product safety and sustainability.

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