

ENERGYUNLOCKED

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Dear Energy System Integration Team,

Please find below Energy Unlocked's response to the call for evidence: a plan for a Smart, Flexible Energy System. The recommendations outlined below are based on experience from new market entrants in the energy sector, international policy and case studies.

About Energy Unlocked

Energy Unlocked is a non-profit independent market accelerator for an energy transition that will achieve ambitious 1.5 - 2 degree climate change targets. We support the companies that today are outcompeting fossil fuels to create a different energy system. Energy markets need to evolve to allow a new set of innovators to unlock value, create jobs and address environmental imperatives. We help energy owners, operators and governments clarify market challenges to environmental outcomes so that rapidly evolving innovators can deploy future energy systems, today. We run market challenges to influence policy and strengthen the innovation ecosystem around innovators to ensure these companies are not locked out of providing their solutions on a level playing field.

Over the past year Energy Unlocked has completed a global scan of advanced solutions in energy 'productivity.' Of the 100 companies that joined our energy innovation platform, EPIC, at least 20 are categorised as 'flexibility services' such as storage or demand response, and at least 40 others are in the smart energy demand services such as new software for utilities to manage their assets and networks, or commercial building owners to analyse and adopt 'smart' energy savings. Additionally, some smart cities solutions such as mobility services for the public sector entered.

(<http://epic.energyunlocked.org>)

What do we see?

We are moving toward a consumer-centric, distributed model of electricity provision. This has many drivers. Today's energy system, the cornerstone of prosperity for over a century, is operating at too high an environmental and economic cost, and is still failing to reach 1 billion people on the planet. New capabilities such as peer-to-peer platforms, blockchain (a secure transaction platform that underpins Bitcoin) and Internet of Things are already disrupting current business practices, cutting out the 'middlemen'

and creating value based on a new, decentralised computing. This disruption is also inevitably coming to energy. Unlocking innovation today will allow us to most effectively tackle the energy 'trilemma.' All UK businesses would benefit from reduced overheads through flexible energy services so this is a win win for new & old industries.

How should the UK shape this future, and prioritise its proactive response? For the UK, more than any other driver, cost to consumers may be highest on the political agenda. Global positioning of the UK as an innovative energy leader, where inward investment and export opportunities are increased, may be a close second. In theory, a 'smarter' and more renewable energy system should be more productive (and therefore 'cheaper' to consumers) but in practice the transition from where we are today to this future could be paved with costly decisions. How does the UK avoid the high costs of inevitable energy transition?

Which markets are most likely to see which business models succeed?

Priority areas of the Smart Energy consultation include the following and here we include leading international examples of companies that demonstrate viability (and under what conditions).

- Commercial and residential DSR: In California, by 'gamifying' demand response for households, a company is achieving a 50% customer shifting in response to text messages, showing that the market potential of DSR does match the technical potential (as highlighted in the consultation overview, 30-50% more flexibility is possible). This level of demand shifting is possible under the Demand Response Auction Mechanism. DRAM is a pilot program designed to encourage the private sector to participate in a new market model for demand response, in order to pave the way to a larger percentage of renewable energy in California. The 2016 DRAM pilot allowed multiple California-based companies to create innovative programs for tens of thousands of residential customers to eliminate the equivalent of a peaker plant. The DRAM pilot cost a fraction of building a new power plant. At scale, this pilot would save ratepayers \$500mm-\$1b. What this means is that everyone - not only flexible customers - benefit from the cost savings in a flexibility-enabled market.

Commercial DSR is more common because typically these sites are better metered and settled based on actual consumption. A number of companies in the EPIC platform were unlocking flexibility in storage and asset management on customer premises, mainly in the US, Germany, the UK and Australia (also emerging solutions in India).

- Flexibility trading/optimisation platforms: In Germany, a peer-to-peer trading platform allocates PV to local storage or neighbours across local or vast 'communities' that encompass an entire supplier customer base. In Brooklyn, a similar platform lets neighbours share excess electricity, both operating through electricity suppliers. In the UK, the current trials in this space demonstrate that the data is available to assess the actual generation capacity, consumption and

shareable portion of generation to neighbours (to facilitate peer to peer trading) and is similarly operating via a supplier. Though the promise is that these platforms could avoid suppliers of electricity altogether, the only planned pilot we have seen to do so is in New Zealand where the company provides blockchain-based transactions directly engaging with the Distribution Network Operator. A number of international entities are already thinking about how to entirely redesign energy markets where only the 'bidding' is competitive and everything else (security functions, communications) is an open source platform (the Grid Singularity company and a group of blockchain-app developers will be experimenting with creating common code base for applications.)

- **Storage costs:** The most difficult challenge for storage project developers is getting the data to develop good business cases that 'stack' revenue as discussed in the consultation document. One California-based company highly recommended the storage mandate which required a way for companies to experiment at the MW scale with contracting and deployment to more realistically develop business cases when the GW scale will be required.
- **Vehicle to grid:** The true value is not in drawing from the vehicle battery (at this stage, batteries would be too expensive) but timing the charging of the vehicle for optimal off peak times. One of the companies on the EPIC platform is interested in entering the UK market, and being able to navigate the complexity of revenue streams is a major first step.

What international examples show

- Capabilities are emerging all the time that could be utilised in the energy space but we are not capable of meaningfully deploying these until market conditions change. In the PJM market on the east coast of the United States, a market with three times the electricity demand of the UK, 15 GW, or nine per cent of total capacity in 2015-16, was provided by DSR. PJM's capacity market auction has the same contract length for any demand response provider (unlike the UK). But these should be kept short enough that technologies aren't locked in for 15 years, for instance, in our California example above, 50% of customers shift load when contacted, and this company is just a few years old. What will be possible in 5 years when storage more widely deployed?
- The UK is a leading market in terms of technology and capability but is seen as complex in terms of market entry (too many mechanisms for revenue to easily 'stack') and pilots do happen, but without real scalability in the market.
- Germany approved the 'Act on the Digitization of the Energy Transition' in summer 2016 to ensure data protection and security. China has released China's Energy Innovation Action Plan¹ highlighting areas of technological innovation, such as advanced energy storage, grid modernisation, 'energy internet', energy

¹ <http://en.cnesa.org/featured-stories/2016/5/8/chinas-energy-innovation-action-plan>

saving and energy efficiency technologies to help fix problems of grid inflexibility, energy inefficiency and pollution. This demonstrates that there are key issues around the digital energy agenda which may need to be called out in separate legislation.

- The future is clear to the companies: the pathway to the future is murkier.

General Implications

- Do not prescribe technologies: it is easy to get excited about blockchain or try to understand everything about smart meters - instead, companies much prefer specification of the outcome. One example is the storage mandate in CA. Only 'storage' is specified, not the business model or the technologies to support it. Don't prescribe technologies, but DO intervene to ensure clear price signals so that disruptive innovators can do their job of exploiting those.
- New players may not fall into traditional business models and this is to be welcomed (as the new players may surprise us with the outcomes they can achieve). We not only need to demonstrate new technologies but innovative new 'customers' (B2B or B2C).
- Timing is everything. Startups fail if they are held up for too long.
- EVERYONE - not only flexible customers - benefit from the cost savings in a flexibility-enabled market. This is illustrated by the cost savings across the system expected from the DRAM in California. 'Flexible' customers are not necessarily missing out on energy services during peak times, but can draw from batteries or other solutions such as pre-cooling/heating.

Implications in the UK

- New market entrants welcome the 'fast frank' feedback from Ofgem provided through the new Innovation Link.
- We need to ensure that no barriers stand in the way of half-hourly settling customers and costs are lowered for the smaller scale flexibility players to be rapidly brought into the market - homes, cars, small businesses etc. We would support mandated half hourly settlement immediately (not in 2018) if there were no other means to reduce costs of adopting this for all customers (but it is unclear how the price per customer could be set appropriately low - spreading the cost across all customers - without a mandate.)
- It is likely that trialling 'flexibility markets' could happen in parallel to the existing market as a way to inform transition pathways. While a common vision for the Flexibility Market may be useful in terms of aligning stakeholders, experimentation and trials must continue so that the conversations about 'vision' are based on real tests in the market with real customers.

- We need to simplify market engagement for all types of customers (residential, industrial, commercial and innovators building business models that facilitate their engagement) to ensure we unlock potential flexibility, faster.
- Whilst tempting to build new 'architectures' for the energy system, we inevitably cannot be too prescriptive. Blackstart can already be delivered by the Brooklyn peer-to-peer trial (which has meters capable of responding at the sub-second level).
- Rather than focus on architectures, we may need to focus on the skills and incentives in the energy industry so that 'incumbents' can be aware of the benefits of new solutions before they assume a more familiar option is the only one available. This approach could have practical benefits, such as saving hundreds of millions in blackstart costs in the UK. Or the right incentives to look at 'digital' or 'flexibility' solutions before committing to hard network investments (which are incentivized at 6% return) could encourage different investments, and therefore less costly outcomes.

Flexibility is coming to leading markets like Germany, China, Australia, the US and soon India and Brazil. Often the market knowledge or data on asset types in buildings/industry needs to be very precise for companies to be able to compete and succeed in those markets. The UK should be positioning its own trials and market reform to ensure UK companies can go global. We would recommend better international collaboration on flexibility, perhaps through the BEIS disruptive innovation team or R&D calls (such as the Newton or Prosperity fund).

As you can see, Energy Unlocked's network of energy innovators provides a conduit to real life barriers, market challenges and opportunities. We're actively developing a flexibility project for London and we would welcome a meeting with the BEIS innovation team to discuss ideas for pilots.

Sincerely,

Molly Webb
Founder
Energy Unlocked