

National Policy Advisory Paper

Towards a long-term and sustainable framework for solar in the UK



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Authors: Nick Wood and David Pickup, Solar Trade Association

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About the Solar Trade Association

Since 1978, the Solar Trade Association (STA) has worked to promote the benefits of solar energy and to make its adoption easy and profitable for domestic and commercial users. A not-for-profit association, we are funded entirely by our membership, which includes installers, manufacturers, distributors, large scale developers, investors and law firms.

Executive summary

This paper has been prepared by the Solar Trade Association (STA) as a deliverable for the PV Financing project, examining how a low-subsidy solar market could be stimulated. The report sets out a number of recommendations for ways in which central and local government, Ofgem and the industry can encourage the success of a low-subsidy solar market in the UK. These recommendations are based on the expert policy knowledge of staff at the STA, but this paper does not constitute official STA policy. Similar reports have been written by project partners for 6 other European countries (Austria, France, Germany, Italy, Spain and Turkey) and a summary at the European level will also be produced by project partners.

The UK solar PV market has been a success story for British industry, ranking 6th in the world for capacity deployed, and solar is on track to be one of the cheapest UK generation technologies by 2020 (International Energy Agency, 2016) (BEIS, 2016). The industry in the UK has grown and matured quickly over the past five years, and employs a diverse and highly-skilled workforce with supply chains stretching across the world.

Solar is viewed by many analysts and companies as *the* key technology that can enable a smart power system fit for the 21st Century (Energy Post, 2015), (Energy UK, 2016), (Deutsche Bank Markets Research, 2015). The UK has been the market leader within Europe for the last three years (SolarPower Europe, 2016) and could command a leading position within the global solar market which will attract \$3.7 trillion of investment to 2040, a third of *all* power investment (BNEF, 2015).

However, recent changes in the UK’s energy policy framework have significantly impacted investor confidence and market deployment for solar in the UK. These changes have caused installation rates to plummet by more than 80%, with a loss of over 12,500 jobs (BEIS, 2016) (PwC and Solar Trade Association, 2016). The UK’s position as an attractive country for renewables investment is slipping (EY, 2016), and the industry skills and supply chain is suffering.

Importantly, the majority (70%) of cost reductions over the coming years will no longer come from global module manufacturing, but local efficiencies in the other components of an installation, such as logistics and supply chains (IRENA, 2016). The UK government therefore has an opportunity to regain its position as a leader within solar energy across the world. It should do so within a broader programme to develop world-leading expertise in smart power which can be exported across the world. The proposals in this report set out what is required and the positive impact that enabling policies could mean for the industry and for the UK economy.

The focus for the industry today is not on subsidy, but on an enduring long-term framework to allow companies and institutions invest with confidence in the future market. Policy interventions can encourage the commercial development to benefit both the solar industry and the UK economy. A thriving UK solar industry results in lower bills for the consumer, and so we call on government at all levels to work with the industry and other actors in the market to develop this framework.

Summary of policy recommendations

Domestic solar	Commercial Rooftop solar	Large-scale ground-mounted solar
<ul style="list-style-type: none"> • Remove barriers and red tape costs • Promote solar to empower consumers • Deploy solar to tackle fuel poverty • Develop a smarter, greener homes policy • Enable smarter local power 	<ul style="list-style-type: none"> • Remove barriers and increase capacity • Enable efficient grid connections • Value exported electricity accurately • Provide a level playing field for clean energy 	<ul style="list-style-type: none"> • Allow the cheapest technologies to compete • Reform market charging and market arrangements

Introduction: Success and abrupt change

The UK solar PV market has been a success story for British industry, ranking 6th in the world for capacity deployed, and solar is on track to be one of the cheapest UK generation technologies by 2020 (International Energy Agency, 2016) (BEIS, 2016). The industry in the UK has grown and matured quickly over the past five years, and employs a diverse and highly-skilled workforce with supply chains stretching across the world.

However, sudden and far-reaching changes in policy since May 2015 have caused a dramatic decline in the market. Concern over the impact of support for renewables on consumer bills and an overspend across all renewables on the Government’s cost control mechanism, the Levy Control Framework (LCF) led to premature removal of support. At the time, solar was highlighted by Government as one of the main causes of the LCF overspend due to higher than expected deployment, but National Audit Office analysis shows solar was wrongly targeted; it contributed just £130m (6.5%) of the £2bn projected increase in overspend (National Audit Office, 2016).

Nonetheless Government took abrupt action; the FiT was reduced by 72% in February 2016; the RO has been closed for projects >5MW, with grace periods for those <5MW until the scheme fully expires in April 2017; there is no indication of a further ‘Pot 1’ Contract for Difference (CfD) auction for mature technologies, meaning no route to market for large scale solar. In addition, the Levy Exemption Certificate scheme has been removed for renewables, with the Climate Change Levy now applied to all energy regardless of carbon footprint; and on new build, the Zero Carbon Homes policy was cancelled without consultation a year before implementation following a decade of industry engagement and investment. Consequently, despite warnings from industry, there has been an 83% year-on-year drop in deployment under the FiT (Solar Trade Association, (pending)). Deployment has dropped even more dramatically when considering all solar markets, as shown below. An estimated 12,500 jobs had been lost in the industry by summer this year (PwC and Solar Trade Association, 2016), and the UK has now slipped to an all-time low in EY’s *Renewable Energy Country Attractiveness Index* that measures investor confidence. (EY, 2016).

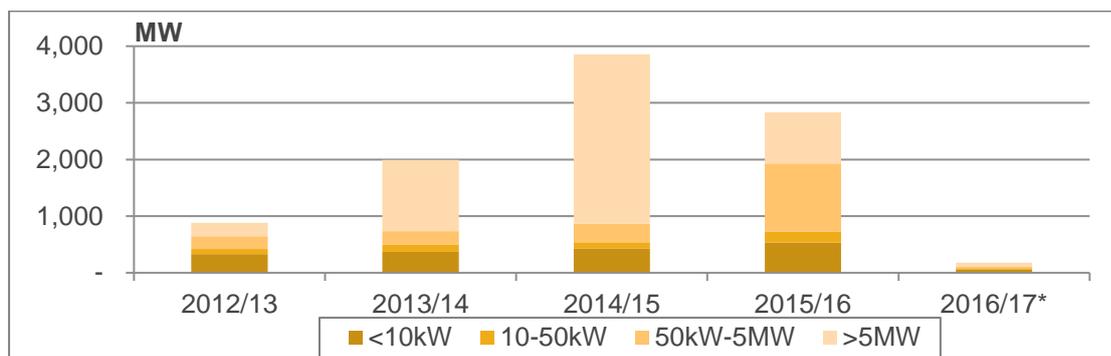


Figure 1: UK solar PV deployment by financial year. (BEIS, 2016)

These aggressive policy changes have been implemented too quickly, and risk leaving the sector in a policy vacuum. Only the remnants of previous policies provide a small amount of further deployment and there are no positive policy developments for solar power on the horizon. It is within this context that the recommendations in this report have been made. The focus now is on developing a long-term stable framework alongside short-term stabilisation of the industry.

Future cost projections and the need for a strategic approach

The growth of the solar industry in the UK has brought cost efficiencies through maturation and increased competitiveness from a wider range of UK and global players (Solar Trade Association, 2014). The cost of deploying solar in the UK has reduced by more than 60% since 2010 (KPMG, 2015), and although some of this cost reduction has come from global module manufacturing, a significant proportion has come from supply chain efficiencies. A report by the Centre for Economics

and Business Research found that the UK content for solar installations was 45% and could rise to 57% by 2030 (Centre for Economics and Business Research, 2014).

The government estimates the Levelised Cost of Electricity (LCOE) of large scale solar will be level with natural gas by 2020 and the cheapest generation technology by far together with onshore wind by 2025. (BEIS, 2016) However, analysis shows that, globally, 70% of solar PV cost reductions over the coming decade will come from the so-called Balance of System¹ (BoS) (IRENA, 2016).

FIGURE 7: GLOBAL WEIGHTED AVERAGE TOTAL INSTALLED COSTS OF UTILITY-SCALE SOLAR PV SYSTEMS AND COST REDUCTIONS BY SOURCE, 2015-2025

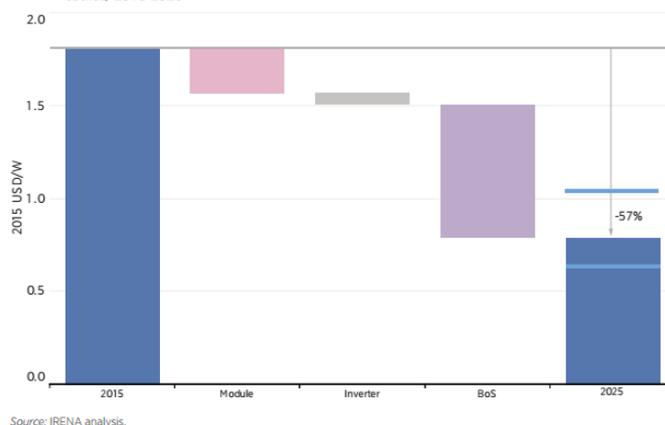


Figure 2: Global Utility-scale Solar Cost reductions by source to 2025. (IRENA, 2016)

These BoS costs are highly dependent on the market and policy landscape within each country, which explains the significant discrepancy in BoS system costs across the world. To give one example, Germany has a BoS cost around a third less than the UK. To realise the significant cost reductions that the UK Government forecasts for solar, it is therefore necessary for Government to enable cost reductions in BoS, as well as to stimulate the mass market that enables industry investment.

FIGURE 2: DETAILED BREAKDOWN OF SOLAR PV BoS COSTS BY COUNTRY, 2015

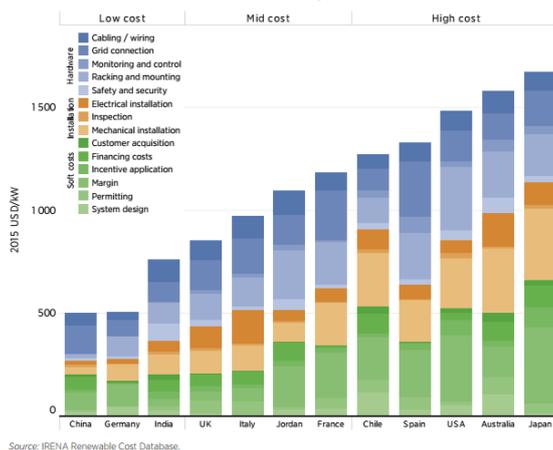


Figure 3: Detailed Breakdown of Solar PV BoS costs by country in 2015. (IRENA, 2016)

¹ These costs include components cabling and racking and wider project costs such as grid application and inspection, planning approval, legal and technical advice and system design.

The UK opportunity in solar

Solar presents the UK with multiple strategic economic opportunities:

Solar is cheap. Government analysis now projects that large scale solar PV could be the cheapest form of new electricity generation, alongside onshore wind, within the next five to 10 years (BEIS, 2016). As ageing capacity on the system is decommissioned and the UK simultaneously electrifies transport and heat, it is in the interest of consumers that we meet this gap with the cheapest generation available. New research also shows that the system cost of integrating variable renewables is modest at the levels of penetration needed to meet our 2030 carbon commitments; they are still cheaper than traditional generation, even accounting for the costs associated with variability (Aurora Energy Research, 2016). Research by Imperial College for the National Infrastructure Commission shows combining renewables with greater system flexibility can bring huge net economic gains while also retaining security of supply. Solar is also distributed - generating electricity at or close to the point of use which has the potential to reduce overall demand and the need for costly transmission network reinforcements within a smarter system.

Solar provides good quality jobs. Solar is the most jobs-rich energy technology in terms of jobs provided per generation output. At its peak in 2014 the UK industry employed 35,000 people. The sector has developed a workforce built on highly valued, transferable skills while providing opportunities across the UK (Solar Trade Association, 2015). Recent research has shown that one third of these jobs has now been lost (PwC and Solar Trade Association, 2016). A strong solar industry will boost employment and help to retain and develop a skilled labour economy (Centre for Economics and Business Research, 2014).

Solar cuts carbon. The UK is committed to reducing carbon emissions by 80% from 1990 levels by 2050. The Committee on Climate Change says electrifying our heat and transport network is necessary to meet this challenge, with consequent increases expected in electricity demand (Committee on Climate Change, 2015). Solar provides the dual benefit of being one of the cheapest forms of generation while also cutting emissions.

Solar is good for exports. Globally, 2016 will see solar attract more investment and employ more people than any other renewable power source (IRENA, 2016). The IEA expects renewables to absorb two-thirds of all power investment to 2020 (IEA, 2015), with solar set to attract \$3.7 trillion or a third of *all* power technology investments to 2040 (BNEF, 2015). The UK benefits from being an early mover in this market, with currently the sixth largest solar capacity deployed in the world (Bloomberg, 2016). The expertise and experience of UK solar companies could put them at the forefront of the global sector where their skills, knowledge and services are in high demand. A strong solar economy at home will enable them to pursue opportunities abroad, boosting trade and GDP.

Solar is uniquely placed to be the bedrock of our smart energy future. The National Infrastructure Commission, Ofgem and Government have identified the direction of travel in the UK energy system towards a smarter, more flexible energy system (National Infrastructure Commission, 2016) (BEIS and Ofgem, 2016). The UK electricity market is relatively less interconnected than those in similar economies, creating an incentive to seize this opportunity sooner. A smarter system in future will require greater demand and supply flexibility to maintain the system balance, using synergies across a portfolio of different technologies and appliances. It will empower consumers, as well as new market entrants and distributed generation and provide more localised price signals. The technical and financial characteristics of solar have stimulated much of the recent innovation in the power sector so it sits naturally at the heart of this transition. 'Baseload' has become an outdated term in energy supply (National Grid, 2015), as solar and other renewables with zero marginal costs dispatch first and are complemented by flexible generation and demand.

Policy recommendations

The policy recommendations in this report have been developed by the Solar Trade Association's team of policy experts, and are intended to highlight different ways in which the local, regional and national governments as well as Ofgem and the industry itself can encourage the development of market for solar power in a low-subsidy environment. However, although the recommendations have been developed with some consultation and discussion with members of the STA, they do not constitute official STA policy and may be subject to further review and more detailed specification in the future. As such, many of the recommendations are at a high level and are principle-based, rather than relating to specific policy proposals or legislation.

The recommendations are split by the different solar market segments:

- Domestic (<10kW)
- Commercial rooftop (10kW-5MW)
- Large-scale ground mounted (1MW+)

Domestic solar market

The domestic solar market is sensitive to consumer confidence as well as the underlying profitability of projects. Additionally, although the cost of generation is relatively higher at the domestic level compared to commercial or industrial installations due to scale, the comparator is the *retail* rather than *commercial* electricity price. Our recommendations for this sub-market focus upon stabilising the industry alongside encouraging the development of business models centred on package of smart technologies.

Remove barriers and red tape costs

Profitability is important in the domestic market as a macro-economic factor for the development of the industry. In short, if something is more profitable then more people are likely to buy it. The profitability of domestic solar sharply fell with sudden cuts to the Feed in Tariff policy, which has caused a significant drop in the market size.

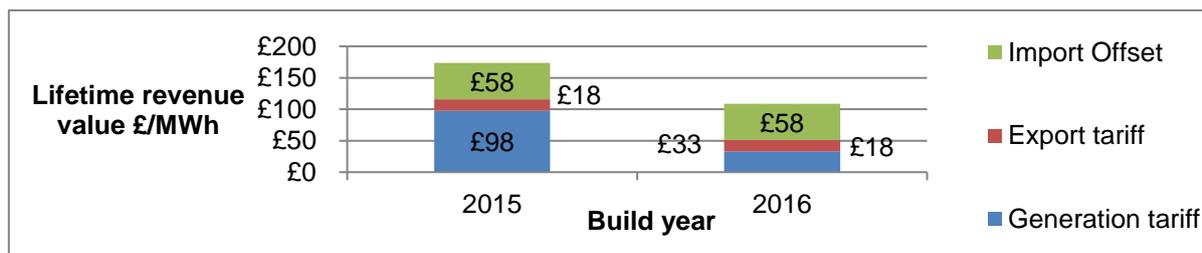


Figure 4: Change in revenues for domestic solar. Source - STA analysis

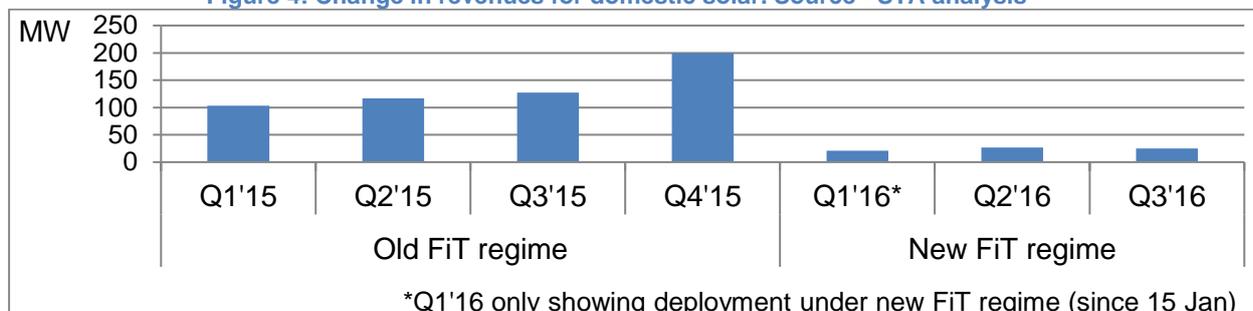


Figure 5: Solar PV deployment under Feed-in Tariff (0-10kW). (BEIS, 2016)

The FiT subsidy has been cut as shown above, and costs now need to reduce to re-establish profitability to a point where consumers will re-invest. However, the 80% overnight reduction in FiT

means that cost reductions have not had time to reduce organically as they have over the past 3 years, and profitability remains very challenging. Stabilising the industry through stripping away unnecessary costs and removing barriers (such as the EPC requirement for the Feed in Tariff), while not increasing costs through other policy changes (such as removing reduced rate VAT), should be an important short-term step for the government.

Recommendation for central government

Actively drive cost reduction within the industry through reducing red tape, and confirm the retention of reduced rate VAT for domestic solar. Streamline application processes to minimise disruption to households and installers.

Promote solar to empower consumers

Although the profitability of solar at the domestic level is important, there are other aspects beyond economics which impact a household's decision to install solar. In particular, the reduction of electricity imported from the grid through use of solar with energy storage and other technologies can be attractive to a homeowner, as well as the empowerment of self-generating and use electricity. The industry needs to therefore adapt the "sales pitch" to focus less on the financial investment and more on the wider energy bill reduction, increasing self-consumption and environmental benefits of a solar installation.

Recommendation for the industry

Evolve the selling approach for solar to focus on promoting the wider energy bill reduction, environmental benefits and consumer empowerment benefits of solar as part of a smart energy package.

Recommendation for central government

Work with the industry to encourage the use of solar and other smart energy technologies to consumers.

Deploy solar to tackle fuel poverty

Solar has been shown to have a significant benefit to fuel poor, social and local authority tenants through a number of programmes funded by the Feed in Tariff scheme. Local authorities have a clear role to play in encouraging further programmes and providing these benefits to as many tenants under housing association management as possible. Although profitability is more challenging after the Feed in Tariff cuts, local authorities with their low cost of capital are well placed to encourage business model innovation. The financial benefits of solar to tenants in social housing can be greater as they are often on pre-payment meters, paying higher retail electricity prices.

Recommendation for local governments

Proactively encourage and drive solar programmes on social housing within the local area to develop new business models while providing benefits to those tenants.

Develop a smarter, greener homes policy

Solar is at the heart of a future smart home. A suite of technologies including electrical and heat storage, smart meter, controls and appliances, and electric vehicle charging, can sit alongside the generation capacity of solar to make energy use in a home fit for the 21st century. This push towards smarter homes and so-called "prosumers"- consumers that also produce their own energy - should be actively supported and encouraged by both local and central government. Central government has the role of setting out the overarching strategy and vision for how this could be achieved and local government has a role in bringing together the relevant bodies to implement this strategy.

This overarching strategy will need to cover two key areas: the retrofitting of the existing building stock to meet the UK's carbon budgets, and the futureproofing of new build homes through higher building standards such as those in place for Scotland and London.

Recommendation for central government

Set out a strategy and vision for smarter, greener homes, both for retrofitting existing homes and encouraging new homes to be as futureproofed as possible.

Recommendation for local government

Working with house builders, social housing providers and the relevant industries, bring together the different components of a smarter, greener home to implement this overarching strategy. Make full use of local government powers through the Planning and Energy Act to drive energy efficient and energy generating homes.

Enable smarter local power

The use of smart technology alongside solar can increase the self-consumption of generated electricity within a home. Using any electricity exported to the grid locally has a benefit both for the grid and for local homeowners, and should be actively encouraged. By unlocking the business models to sell solar locally, the government could enable the power generated in communities to deliver power and benefits to those communities.

Recommendation for central government

Explore changes to licensing regulations to enable local energy trading and encourage the development of non-traditional business models based on valuing local energy fairly.

Recommendation for local government

Incubate and develop ways to retain the value of locally-generated electricity through local supply models and companies.

Commercial rooftop solar

Commercial rooftop solar has historically been only a small part of the market within the UK, unlike similar markets in Europe such as France and Germany. This is illustrated by the graph below from SolarPower Europe’s Global Market Outlook (SolarPower Europe, 2016).

FIGURE 16 EUROPEAN SOLAR PV TOTAL CAPACITY UNTIL 2015 FOR SELECTED COUNTRIES

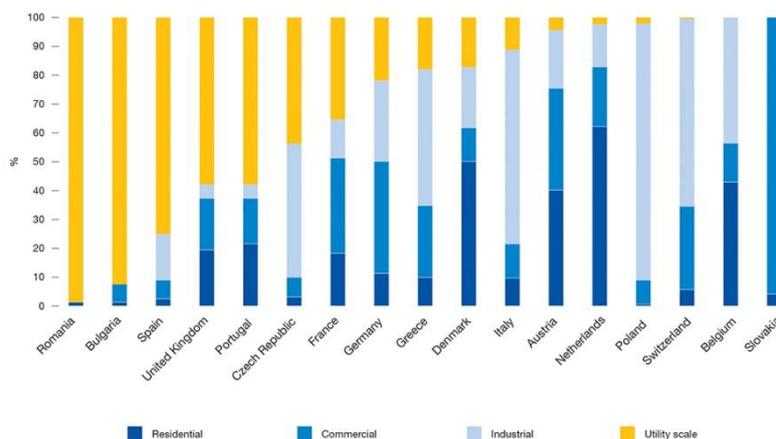


Figure 6: European Solar PV Capacity by sub-market for selected countries. (SolarPower Europe, 2016)

This is partly due to structural issues in the market (such as the high prevalence of rented commercial buildings and the relatively few owner-occupied commercial buildings) and also due to the stop-start nature of the subsidy schemes clashing with the longer-term decision processes that are required in larger commercial organisations.

Remove barriers and increase capacity

Corporates are much more returns-sensitive than domestic consumers, and therefore the profitability of a solar asset plays an important part in decision making. Alongside this, long-term certainty is key both for built projects and future projects; the process of signoff by a commercial customer could take a year or more and therefore if policy is disrupted during that period it could significantly impact the timelines of that project. The current Feed in Tariff scheme is currently capped at a very low level and this brings significant uncertainties to the market. The Solar Trade Association has developed a set of easily adopted near term proposed amendments to the Feed in Tariff scheme to bring more certainty for the commercial market (Solar Trade Association, 2016), centred around adjustments to these caps, and we recommend the government brings these into force as quickly as possible.

The recommendations in this section are therefore intended to remove the barriers which constrain deployment, allow for growth through raising the caps which will encourage economies of scale, resulting in more stable returns short term. This will enable UK cost reductions, particularly on the BoS, while at the same time industry develops a longer-term framework with market signals to encourage businesses to generate their own clean energy.

Recommendation for central government

Implement the Feed in Tariff asks as set out in the Solar Trade Association's *Making Feed in Tariffs Work* policy paper as soon as practically possible.

Enable efficient grid connections

Grid access is an increasingly important barrier for the commercial rooftop sector, with many developers reporting that DNOs are rejecting connection requests due to a lack of available capacity. This occurs even with managed solutions such as grid operator-controlled export limiters, and in spite of the high on-site usage which the business case for many commercial rooftop installations relies on.

Enabling improved and more efficient grid connections for solar projects will be critical for the continued deployment of solar in the UK. Detailed discussions are required between the industry and grid operators, facilitated by the regulator, to understand the relevant issues and resolve them through flexible connection offers, regulatory change and technical solutions and making more efficient use of underutilised capacity. The shift towards DSOs should be accelerated to allow the local networks to become much more actively managed.

Recommendation for the regulator (Ofgem)

Facilitate a discussion on how to enable further grid connections for solar power with the solar industry and grid operators. Explore options for solutions such as priority access, flexible connection offers, export limiters, and reducing grid upgrade cost burdens for individual customers. Speed up the transition from DNOs to DSOs.

Recommendation for the industry

Work with the local and national grid operators to understand the constraints they face and resolve capacity issues through a range of technical and commercial solutions.

Value exported electricity accurately

Exported electricity from future commercial solar projects will ideally be valued through a commercial arrangement with an energy supplier. However, in some cases this will not be possible, and in any case these arrangements are difficult to obtain or predict for the full lifetime of the solar asset (20+ years). For smaller installations including schools, homes and small businesses, it would be impractical to set up a commercial arrangement.

To provide certainty, the market requires a framework similar to the export tariff for the Feed in Tariff or the Offtaker of Last Resort for the Contracts for Difference policy (Ofgem). This framework would provide a guaranteed export value for that exported power, which would be fixed (rising with inflation), based on the real market value of that power. Using this approach rather than a more complicated

value based on the price of power would enable companies to model their solar investment with more certainty, with any commercial arrangement negotiated an upside beyond this baseline.

As well as commercial rooftop solar, valuing this exported electricity is critical for the domestic market.

Recommendation for central government

Develop a framework to ensure that exported (spilled) electricity is fully and fairly valued throughout the lifetime of a solar asset at all scales of solar.

Provide a level playing field for clean energy

Many of the benefits of solar and associated smart technologies for commercial rooftop projects are not monetised: this includes the reduction in demand throughout the year and in particular at peak times, the offset of higher-carbon imported electricity and the reduced use of the transmission grid. At the same time, there are attractive tax frameworks for investing in other commercial-scale infrastructure such as energy efficiency. From business rates to capital allowances, the tax system does not yet reflect the benefits of solar.

If there is a clear market signal towards investing in solar generation, this will encourage businesses to invest. Therefore, through a holistic review of charging arrangements, a review of the business energy and carbon tax schemes and the introduction of more local ancillary and balancing services, the government and involved actors have the opportunity to clearly signal the value that self-generated electricity brings.

Recommendation to central government

Work with the regulator and grid operators to drive the reform of charging arrangements, energy market arrangements and carbon/energy tax setup to fairly reflect the value that self-generated clean energy brings. Review the tax framework to provide a level playing field for solar investment.

Large-scale ground mounted solar

Large-scale solar has been a significant part of the solar market over the past 3 years. With the early closure of the Renewables Obligation, once the last grace period projects completed in March 2017, there will be no route to market for ground-mounted solar. This is despite large-scale solar being recognised through government analysis alongside onshore wind as the cheapest way of generating clean power by 2020, and the cheapest way of generating power outright by 2025 (BEIS, 2016). As the vast majority of cost reductions for the next 10 years need to come from balance of system costs which are highly policy and country-specific, there is absolutely a role for the UK government in encouraging that cost reduction to deliver the cheap and clean power needed for a decarbonised electricity system in 2030.

There are two main focusses to our recommendations for the large-scale sector: allowing solar to compete for price certainty contracts within the Contracts for Difference framework and more fundamental market reform to create the right market signals for a smart and clean power system fit for the 21st Century.

Allow the cheapest technologies to compete

It is now accepted that large-scale solar and onshore wind are the cheapest electricity generation options for decarbonisation of the electricity system (BEIS, 2016). However, other, less established technologies (known as Pot 2) are being prioritised for the Contracts for Difference auction scheme ahead of the more established technologies including onshore wind and solar (known as Pot 1). It clearly makes economic sense to support the cheapest technologies in order to most efficiently bring forward generation capacity, and therefore additional, regular auction rounds for the established technologies should be brought forward.

Despite the low cost of solar compared to other options, a model based on the wholesale price alone is not investable and therefore price certainty is key. A Contract for Difference, therefore, provides that

price certainty while also encouraging cost reductions through intra- and inter-technology competition on strike price.

The long-term future of the CfD scheme is currently being discussed in the market, with reductions in strike prices and accurate accounting of other factors such as carbon prices and integration costs potentially providing the basis for technology-neutral auctions for power generation. A number of bodies have made it clear that price certainty is not a subsidy per se (Policy Exchange, 2015) (Committee on Climate Change, 2015), and as a result the CfD framework has the potential to evolve into a market-based tool for providing the low-carbon generation that the UK needs in the 2020s.

Recommendation to central government

Develop a series of auction rounds for the more established technologies (Pot 1) in the period to 2020, and develop a framework for regular auctions for these technologies beyond 2020 to provide market stabilisation and new electricity generation at lowest cost.

Reform the market charging and market arrangements

The current electricity market arrangements do not provide the right signals for a smart and flexible energy system. Fundamental market changes have occurred over the 10-15 years including the introduction of the capacity market, the retirement of existing generation plant, the volatile and suppressed wholesale electricity price and the growth of decentralised power generation. Given that level of change, it is now the time to fully review the electricity market and all the associated arrangements to reflect the fundamental changes that have occurred within the market and beyond and the future requirements of deep decarbonisation alongside retaining best use of cost and ensuring security of supply.

Recommendation for central government

Drive the holistic reform of the electricity market to provide cost-reflexivity, encourage competition through the continued use of technology-neutral tendered or auctioned procurement programmes, and develop new markets and services for the flexibility, smart and local power needs that the UK power system will need in the future.

Next steps

The recommendations set out in this report for the range of bodies involved in the energy industry are the first step in a conversation about effecting change. Through the PV Financing project and the STA's own processes, these recommendations will be disseminated and discussed with the relevant parties to bring forward a sustainable framework for the development of solar at all scales in the UK.

Solar is uniquely placed to be the bedrock of our smart energy future and provides a tremendous opportunity to the UK: we call on both central and local government as well as industry to work together to turn this opportunity into a reality.

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