Consultation on Sark's Electricity Price Control

Anthony White
Commissioner

Summary

This paper describes how a fair and reasonable price for electricity on Sark may be established. Prices on the island are high because of its relatively small size and the decision to bury all cables. For the power company to earn a reasonable return, I estimate prices would need to be about 55p/kWh for 2018 at current levels of demand. However, this system of pricing has led to an untenable position. Demand has been falling for various reasons and prices have been increased to protect, in part, the power company's profitability. This pricing strategy has rendered the system vulnerable to customers installing their own generation and, potentially, storage. Should on-site generation proliferate, the value of the Sark Electricity Limited's assets would be lowered and make a reduction in prices to the 30-40p/kWh range inevitable. With current levels of demand and fuel prices, I am minded to set a "fair" price at 45p/kWh for 2018, though I recognise that this will not enable investors in SEL to enjoy a "reasonable" return. It is my expectation that such a price would encourage an increase in demand and allow the electricity company to make reasonable returns in the future.

Introduction

1. My Office was established by the Projet de Loi entitled "The Control of Electricity Prices (Sark) Law, 2016". In simple terms, my duties are to determine whether the prices charged for electricity are fair and reasonable. This covers the sale of electricity to someone else which, effectively, means the operation of Sark Electricity Limited (SEL). If I find that SEL's prices do not satisfy this test, I may make a "price control order", which puts an upper limit on the prices charged. Such a limit may also be applied to other services offered in conjunction with the supply of electricity, such as the purchase of surplus electricity from a customer with photo-voltaic panels.

2. Electricity prices on Sark are high. The price for 2018 has just been published as 69p/kWh$_e$, which is far higher than anywhere else in the UK. Sark Electricity Limited has been consistent in its view that the high price is a direct consequence of Sark's isolated location and the relatively small size of the market. I accept that, with current technologies, where economies of scale are strong, it is inevitable that the price of electricity on Sark will be higher than on the mainland. The question I am seeking to answer is "how much higher".

Reasonable electricity price

3. In order to arrive at a "fair" electricity price", I estimate what a reasonably efficiently run company needs to charge if it is to make a reasonable return on investment. I will estimate the costs of generating and delivering electricity to customers by considering

the costs of fuel and building, operating and maintaining the associated diesel engines, transformers, cables and switches. This will include an allowance for depreciation to ensure that there are sufficient funds to be able to deliver secure and reliable supplies. I will also calculate a reasonable profit that investors in SEL could reasonably hope to enjoy, based on the risks to which the company is exposed.

4. This leads to a simple process for calculating a reasonable price for electricity:-

- make an assessment of the "asset value" (AV_1) of the equipment currently employed in the business. I will make an estimate of this by considering the cost of replacing the entire existing system with new equipment (meters, cables, switches, transformers and generators).
- I will lower this figure by depreciating individual assets according to their remaining useful lives to give the asset value (AV_2) or Regulated Asset Base (RAB). So, if an asset with a 50 year lifetime is just 20 years old, it would be 60% of the cost of a new one. I do not have access to an "asset register", detailing the age of each piece of equipment, so I will have to make an estimate for each type of asset.

- calculate the annual depreciation cost = AV_1/lifetime = D

- add the cost of generating power at the power stations, based on the expected demand and fuel prices (G).

- add the cost that would be incurred by a reasonably efficient company in maintaining and operating the system (O&M). I will need to do this by looking at other small, isolated systems. One major difference is that Sark's system is all underground.

- add a profit margin, calculated as a return (R%) on the Regulated Asset Base (RAB) = AV_2. I expect that a reasonably efficient operator should aim to achieve a return of around 5-10% in real terms. This reflects the size of returns investors in the UK (same currency) have been willing to accept.

- Under this scheme, SEL's annual revenue would be:

  - Revenues = G + O&M + D + R x RAB

5. I think that this would be fair to both consumers and Sark Electricity Limited. It would not be fair just to compare Sark's prices with those on other islands, owing to the different circumstances, such as Sark's network being buried, the system being relatively small and the difficulties in delivering equipment to the island.

Operating Costs – variable

6. The company purchases diesel fuel to operate its four diesel engines. This is delivered to Sark by ferry and the price is related to the world price, as revealed by Platts, to which is added a transport charge. Currently, I estimate that the market price for diesel fuel delivered to Sark in the volumes required by SEL is around 55p/litre. This represents a 17p/litre premium over the price at the docks in Guernsey.

7. The amount of electricity that may be generated from the fuel depends on the efficiency of the engines. This will be affected by the loading on the engines (full or part load), ambient temperature and hours of service. I expect diesels of the type employed by SEL should be able to achieve, on average, an efficiency of around 35%. When running flat out, these diesels should achieve efficiencies of around 42% but, since demand rises and falls, some of the diesels will be forced to run at sub optimal levels. Nevertheless, the penalty of "load following" is not great with diesels. The energy content of diesel fuel is about 10kWh/litre. This implies that diesels with 35% efficiency will be able to create about 3.5kWh of electricity (3.5kWh$_e$) per litre, suggesting that the marginal cost of power at the power station is about 15/kWh$_e$ on average. However, this power is transported across the electricity network and there are unavoidable losses in the cables and networks. I assess these, on the basis of other networks, to be around 8%. I will assume that the marginal cost of delivered power is therefore around 17 p/kWh$_e$. I expect to be able to monitor these losses by examining the difference between the total of all customers' meter readings and the generator meters.

Operating costs – fixed

8. The electricity company will require staff to operate and maintain the generating plant and the network, as well as all the other corporate activities. It provides for transport, mobile equipment, spares, services and consumables to maintain and develop the network and it also meets the need access for working capital. I have been provided with the accounts from 2012 to 2016 for SEL. On the basis of my analysis, I estimate staff costs will amount to around £290,000 per annum and other costs to £55,000 per annum. This provides for five engineering staff, administrative and financial support, and a non-executive Chairman.

Return

9. I assume that a reasonably efficient electricity supply company will seek to make a reasonable return on its investment in the generators, transformers, switches, lines cables and meters that are required to provide supplies. In arriving of an assessment of what is a "reasonable" rate of return, I recognise that SEL is a "de-facto" monopoly supplier of an essential service, i.e. the provision of electricity and I believe that, in order to keep prices as low as possible for customers, SEL should be able to pass through to customers the effect of events outside its control, such as movements in fossil fuel prices and changes in demand. Otherwise, investors would require higher returns, to reflect

potential losses caused by such movements. As such, this should be a relatively low risk investment, unlike the large electricity suppliers on the mainland, like Centrica and e.on who are exposed to such risks. On this basis, I believe that providers of finance would be satisfied with a return of somewhere between 5 and 10% in real terms. This is at the upper range of returns for similar RAB based investments (water and electricity network companies) in the UK. I recognise that investments in Sark have some features that are unique, such as the difficulty of obtaining mortgages on property. Nevertheless, investors in SEL should take comfort that the Control of Electricity Prices (Sark) Law requires me to take account of the need for the company to maintain the system of electricity supply. I must recognise that SEL will need access to capital, like the other RAB regulated network companies in the UK. In addition, investors will appreciate that the company's profits are not taxed.

Asset size

10. SEL has provided me with a list of its assets together with a consulting engineer's assessment of the cost of replacing all the assets as new. This was based on the specifications of modern electricity systems with current safety standards. The total assets, valued in this way, amount to £3.8m, as shown in Table 1. However, SEL's assets are not new. Some allowance is required for their depreciation due to their limited remaining useful lives. I have assumed a simple linear depreciation. These depreciated assets, described as "Modern Equivalent Assets", make up the "Regulated Asset Base" (RAB) on which I expect the company to make a reasonable return. I expect this RAB to be adjusted each year for inflation in equipment costs and by any capital expenditure less the depreciation. There is one further adjustment to be made to the RAB. Some customers have paid for their connections to the network, though it is SEL's responsibility to maintain these cables. As a consequence, I have lowered the size of the RAB by these "customer payments", appropriately depreciated as I do not believe it appropriate for SEL to enjoy a return on investment made by others. However, I have included an allowance in the depreciation charge, since these assets will still need to be replaced at some point. I have assumed that customers paid for 10% of the LV cables, amounting to £167,000 of MEA.

Table 1: RAB Table for Sark Electricity

Asset Type	Replacement cost (£k)	NominalLife (years)	Commissioned	Depreciation (£kpa)	MEA (£k)
Generators	209	25	1997-2007	22	210
Network	3,179	40-60	1985-2010	57	2,324
Mobile	49	10	2010	6	18
Customer Contributions	189	60	1985-2007	3	167*
Total	3,783			85	2,552

*Note: customer contributions are not included in the RAB.

Annual Return

11. I would expect investors in such a company to be satisfied with a return of 5-10% per annum on this Regulated Asset Base of £2.552m; i.e. around £200,000 +/- £50,000, per annum, indexed by inflation.

Allowed Revenue

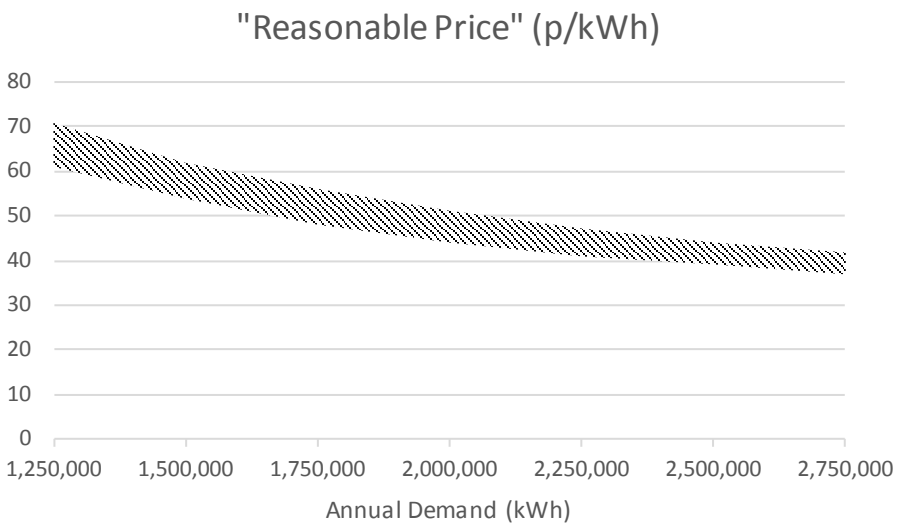
12. The costs of running an electricity supply company fall into two categories; those that vary with the demand for electricity, such as fuel, and those that are independent of demand; i.e. staffing and other goods and services, depreciation and a return to capital. My initial assessment of these is set out in Table 2 below:-

Table 2

Cost item		
Variable		
Fuel	p/kWhe	17
Fixed		
Staff	£kpa	280
Materials, Goods & Services	£kpa	55
Depreciation	£kpa	85
Allowed Return	£kpa	150-250
Total fixed costs	£kpa	560 -660

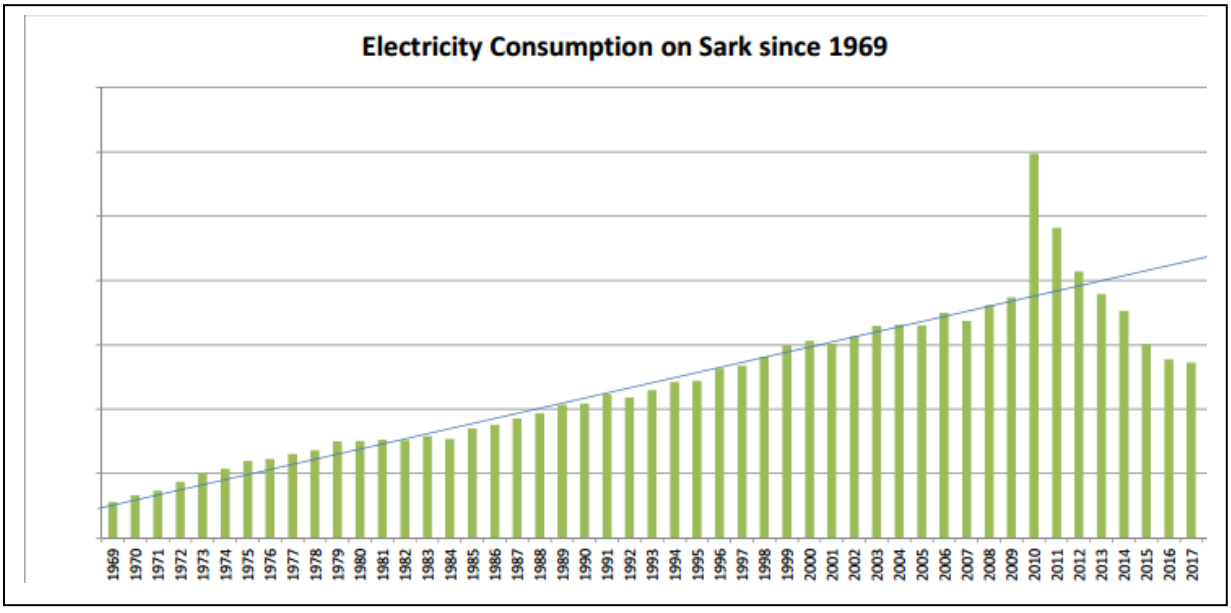
13. A company would seek to cover all these costs through its tariff. Therefore, the price set by SEL for each year will depend on the estimate of demand. Figure 1 shows the "reasonable price" SEL could charge for a 5-10% return on RAB, depending on the demand forecast.

Figure 1



If my assumptions are correct, the current price of 69p/kWh for 2018 is too high. Only were demand to fall to 1,250,000 kWh would a price of 70p/kWh be required to provide SEL with a "reasonable return". If demand grew back to the levels witnessed at the start of this decade, the "reasonable" prices would fall closer to 40p/kWh.

Figure 2



Source: Sark Electricity Limited; newsletter 4Q 2017

On site generation

14. Owners of photo-voltaic panels, existing or potential, may wish to connect their panels to the network. Sark Electricity Limited is willing to provide such connections. However, currently the customer does not avoid paying SEL's tariff but is paid for the PV generated at the lower "export" tariff of 15 p/kWh$_e$. This may seem "unfair", since the PV cells will certainly have been able to supply some of the electricity consumed on site. However, I have some sympathy with SEL's position on this. The company is correct to point out that, if demand falls on account of the relatively well-off installing PV panels, then SEL would not have to burn so much fuel and so would save money. This saving is passed back to the PV owner through the export tariff. Indeed, this nearly matches my estimate of SEL's fuel cost in paragraph 7. However, in order to cover SEL's fixed costs, the overall tariff will have to increase on account of the reduced usage of the network.

The Rub - Sustainability

15. SEL's logic behind the treatment of on-site generation is undeniable but may be short sighted and even unfair to customers. Inspection of Figure 1 on page 6 shows that, even if demand were to recover to the levels seen at the start of the decade, a price of 40p/kWhe would be required to allow SEL to make a "reasonable return". Even this is high by world standards. The price is high on account of the need to maintain an expensive network; primarily the system of buried cables, and provide a return based on the value of these assets. It may well be that residents of Sark are content with paying these prices in return for an "invisible" power system. However, I am concerned that the current position is unsustainable.

16. There have been dramatic changes to generation technology over the last decade. The cost of solar power has fallen and small-scale wind power costs have plummeted. I have been approached by residents of Sark wishing to install their own generation but, until now, have been put off by the terms of retaining a connection to the SEL system. More recently, the costs of batteries have also reduced and are now being installed in commercial electricity systems. It is possible that an "independent" power system would be established on Sark if prices are to continue to be based on a "reasonable return on assets". Such systems could initially serve perhaps one or two dwellings and others could be linked later. Due to the reduction in sales of electricity by SEL, the costs of customers remaining on the SEL system would rise, causing an inexorable vicious circle of price rises. This implies that the "value" of SEL's system of wires and generation, which is based on its replacement value, could well be overstated.

17. I do not know how SEL will respond to this threat to the value of its system. It seems to me that using price rises to protect profitability is unlikely to succeed, nor is it "fair" to customers. If on-site and isolated generation does proliferate, there would be no need to maintain such a large interconnected, buried system on Sark. It occurs to me that a "fair" price for customers may not be compatible with a "reasonable return" for investors. As such, SEL has an option of, for a few years, foregoing a return to shareholders and setting a "fair" price, of 45p/kWh$_e$. It would be able to make a return to shareholders, once demand started to grow.

Consultation

18. Before I write a final consultation paper with specific proposals, I should be very grateful for any comments or suggestions to help improve the process for setting tariffs for electricity on Sark. In particular, I should like to have views on:-

    - the importance of the system being buried and reliable
    - the approach of providing a reasonable rate of return on assets
    - the likelihood and cost of new generation and a network independent of SEL
    - the acceptability of small scale wind generation
    - the allowed rate of return range
    - my estimates of SEL's fixed and variable costs; in particular, whether Sark's unique features are properly incorporated
    - the estimate that 10% of connections were financed by customers
    - whether fuel costs should be passed through to customers
    - how often the tariff should be reviewed
    - tariff structures – I give some further thought on this below
    - performance incentives

In addition, please do not hesitate to contact me at commissioner@epc.sark.gg if you think I have omitted an important issue in this consultation.

Anthony White
Commissioner
Office of the Sark Electricity Price Control Commissioner

commissioner@epc.sark.gg

Further Thoughts on Tariffs

Tariff Structure

1. It seems to me that setting a single tariff is not very helpful, since there is such uncertainty in the demand forecast, though I recognise that it does provide a single, easily understandable, figure. An alternative approach is to spread the fixed part of the tariff over all customers. It could be allocated on the basis of the capacity or voltage of connection and be set every year, or even established for a longer period. Each customer's bill would comprise this fixed payment and the payment for the number of units consumed would be set by the variable part of tariff. For example, I understand that there are around 700 meters on Sark, that suggests 700 different supplies. Each could be charged £70 per month and this would cover the fixed costs. All electricity consumed would cost an additional 17p/kWh$_e$. Therefore, if a customer consumed 2,000 kWh over a year, the monthly bills would amount to £840 per annum and the variable component to £340 over the year, making a total cost over the year of £1,180. Of course, there is the risk that customers would choose to re-wire their properties and combine supplies so that they only use one meter. If this were the case, the standing charge to each remaining meter would have to increase. The answer may be to charge one fee per property, irrespective of the number of meters on the property.

2. An alternative approach, currently adopted by SEL, would be to charge a lower rate for consumption over a certain limit, though this currently operates through a system of rebates. The limit could be set on a quarterly or monthly basis, though there may be a difficulty with bills based on estimated readings. This may cause difficulties for premises that are unoccupied for many weeks, but is certainly a feasible option.

3. I do not have powers to insist on a particular form of tariff. It is for Sark Electricity Limited to decide how it wishes to charge its customers. I can only observe tariffs and take a view as to whether they are fair and reasonable.

Adjustments

4. If the current "one price" form is continued, it will be necessary to estimate the level of demand. This is influenced by changes in Sark's economy and the weather as well as the introduction of new technology. This can lower demand (LEDs or premises going "off-grid" with their own generation) or increase it (chargers for smart phones, large TVs, cookers). Similarly, events elsewhere in the world can have a large impact on the price of oil and diesel fuel. If Sark Electricity is to maintain sufficient working capital to ride through these fluctuations, it would require a far higher return on capital and this would cause me to increase my estimate of reasonable costs.

5. There would be no need to alter tariffs on account of demand forecasting errors if the fixed/variable form of tariff were adopted. Nevertheless, if fuel prices vary dramatically, it will be necessary to estimate the over or under recovery. I will make the assessment based movements in the international price of diesel (Platts) and taking an "assumed

efficiency" for generation. This will give SEL an incentive to operate the machines effectively and minimise losses on the networks.

Other performance measures

6. I am keen to introduce other performance measures that would influence the "fixed" component of Sark Electricity's revenues. I believe that SEL should be rewarded for providing a stable network, such that voltage fluctuations and outages are minimised. This is a way of ensuring that the network is maintained to a satisfactory standard. If, for example, maintenance levels are not maintained, a reduction in performance would follow. I also wish to introduce incentives associated with working with the network itself; i.e. knowledge of cable routes for building work. SEL should also be rewarded according to the speed with which it responds to customers' requests; be it for a new connection, location of buried cables, a disputed meter reading or response to a fault.