Office of the Sark Electricity Price Control Commissioner

Proposal to make a Price Control Order

Summary

1. On 18th May, 2018, I reported that I had found, after consultation, that the prices currently charged for electricity on Sark are not fair and reasonable[1]. I now propose to set a maximum price for sales of electricity on Sark for the next year of 52 p/kWh (1st July, 2018 to 30th June, 2019). I also propose to set a maximum price for sales of electricity of 49 p/kWh for July, 2019 to June, 2020, subject to consideration of any representations that SEL or others may make and any other material matters that become apparent. In relation to both proposals I shall review prices periodically by reference to the factors set out in paragraphs 22 to 27 below. These proposed prices are fair and reasonable in that they are sufficiently low to discourage customers from disconnecting from Sark Electricity Limited's (SEL) network yet high enough to allow SEL to maintain secure supplies of electricity and provide a reasonable return on its investment. The price for 2018/9 will also provide some funding to enable SEL to explore alternative means of generation and finance during that period.

Background

2. The Proposed Determination, published on 13th March, 2018[2], came to the preliminary conclusion that the prices charged by Sark Electricity Limited (SEL) for electricity supplies to all customers on Sark were not fair and reasonable. I have shared my conclusion with the Policy & Performance Committee of Chief Pleas and SEL. The document is also generally available on my Office's web-site; www.epc.sark.gg. Consultees were given until 28th March to respond. I later extended this deadline until 30th[th] April, as SEL requested further information and argued that they needed time to consider it.

3. I received comments from a number of parties on this consultation and on the earlier paper, published in December, 2017. Only one, from Alderney Electricity, suggested that renewable generation might not be competitive with diesel-fired generation but this conclusion depended on the nature of the financing. The Sark Chamber of Commerce, in a press release[3], argued that it would be unreasonable to expect SEL to invest in the network at the initial proposed price of 45p/kWh since, at the current level of demand, SEL would not make a profit. The Chamber of Commerce accepted that there might be "some veracity" in the risk to SEL's business of customers generating their own power. The

[11] Office of the Price Control Commissioner, 18th May, 2018

[2] Office of the Price Control Commissioner, 13th March, 2018

[3] Sark Chamber of Commerce, 25th January, 2018

Chamber failed to suggest a way to protect the financial viability of the existing system and ignored the possibility that demand for power might rise if the price were reduced from the SEL tariff of 66p/kWh. I do not believe it is in customers' interests, let alone SEL's, to ignore this threat to SEL's viability.

4. All the other responses, except SEL, supported the displacement of diesels with renewable generation, but one of these would rather avoid the deployment of wind turbines and one requested assurance that modern inverters would not interfere with telecommunications.

5. SEL argued, as reported in the Determination, that my proposals contained in the Proposed Determination were wrong in law, economics and fact. I explained, in the Determination, why SEL was incorrect in claiming that I could not consider alternative methods of generating power under Section 13 of the Law. I also showed why my analysis was consistent with good regulatory practice but also explained why SEL's absence of an asset register made an assessment of a Regulatory Asset Base difficult. I shared with SEL the calculations behind my estimates of the costs of customers self-supplying and of the costs of larger scale wind, solar and battery systems. SEL did not identify any errors.

6. Having found that the current prices are not fair and reasonable, section 15 of the Control of Electricity Prices (Sark) Law, 2016 (the "2016 Law"), empowers me to issue a "Price Control Order". I may set a maximum price for electricity, and other electricity related services, on Sark for up to two years. In the March 2018 consultation document, I explained that I would set a price at a level that would enable SEL to continue to maintain secure supplies of electricity, invest in wind turbines, solar panels, control systems and batteries and provide a reasonable return to investors. This document explains how I have arrived at the maximum price.

SEL's tariff

7. SEL has set a tariff for the year of 66 p/kWh. The reasons why I do not believe this to be a fair and reasonable price were set out in my Determination. In particular, I do not believe that it is fair and reasonable for customers to pay for the additional costs of:

    - splitting SEL into two companies,
    - higher directors' fees and management expenses related to overseas travel, and
    - professional advice on dealing with regulation.

    These items amounted to £123,000, as reported in the Determination of 18th May, 2018. This suggests that the tariff is at least 9p/kWh too high, given that annual demand is around 1,400,000 kWh. Furthermore, SEL chooses to use shareholders funds to finance its activities, rather than lower cost debt. This suggests that a fair and reasonable tariff would be lower. However, as I explained in paragraph 3 above, customers are at risk of having to pay far higher prices if other customers generate their own power and disconnect from the network. Lower prices would discourage such disconnections, as well as stimulate greater demand for power, and thereby reduce average costs of supply, which would be to the advantage of both SEL and customers.

The cost of smaller scale renewable generation on Sark

8. The costs of renewable generation and associated storage systems have fallen considerably over the past decade, with "integrated" systems being marketed extensively for larger properties on the UK mainland. As part of understanding the status of the electricity market on Sark, I estimated the cost of "self-supplying" electricity. I found that a system of a 4kW of photo-voltaic (PV) panels and 27kWh of battery storage would currently cost £18,000 installed with a ten-year warranty[4]. Consumers might also choose to install a stand-by diesel generator if they could not remain connected to the SEL network. Although £18,000 is a large sum for the average household, there are some on Sark with the necessary funds available. Indeed, such an investment would be very attractive – if finance is charged at 7% per annum, the average cost of the electricity would be around 50p/kWh over the ten years of the warranty.

9. I also commissioned consulting engineers, [5]Narec-DE to undertake an assessment of the costs of larger domestic dwellings self-supplying their electricity. They confirmed that commercially available systems, comprising solar panels, batteries, a small stand-by diesel generator with an automatic controller, could supply electricity at a cost of between 47-55 p/kWh. Their assessment was based on weather data for Guernsey airport, Jersey and La Hague, which are taken as representative of conditions on Sark. I therefore believe that there is a serious risk that customers will choose to "self-supply", unless SEL lowers its prices.

10. For larger consumers, such as hotels, the economies of scale with PV suggest that a lower average cost would be possible, were they to decide to "self-supply". Indeed, I have been approached by owners of large premises indicating that they wish to install the equipment necessary to supply themselves and they suggested they could "self-supply" at a cost of between 38 and 45 p/kWh. Narec– DE confirmed this price range.

11. The "migration" of demand away from the SEL network would cause the unit cost of electricity to SEL's remaining customers to rise. This would be unfair to the customers without access to the necessary funds. It seems to me that a "sustainable" tariff will have to be below 55/pkWh to avoid an upward spiralling of unit costs.

SEL's current costs of electricity supply

12. I explained in the December Consultation paper how the costs of generation from the system fall into two categories; the fixed costs (wages, office costs, repair & maintenance, depreciation and returns to finance) and those that vary with demand, i.e. variable. The Determination, published on 18th May, 2018, reported my assessment of the costs of wages, goods and services a reasonably efficient operator would incur during 2018 was £397,000. SEL will also charge depreciation on the network's assets. Based on these assets' useful lives and SEL's consultant engineer's assessment of the cost of replacing the

[4] See www.nakedsolar.co.uk – www.renewableenergyhub.co.uk. www.ikea.com www.solarquotes.co.uk

[5] Narec-DE "Sark Electricity Review – Part 1, May 2018.

equipment, I estimate the annual depreciation charge at £63,000[6], escalated by inflation. This leads to an annual fixed cost of £460,000. If annual demand remains around 1,400,000 kWh, this would be equivalent to an average cost of 33 p/kWh. This excludes the cost of running the diesels and any return to SEL's investors other than the regulatory £63,000 depreciation charge.

13. I found that the variable cost of generating power was around 15p/kWh, based on the average efficiency of the diesels (240g/kWh)[7], the price of diesel around the English Channel[8] (42.5p/litre average for 2017 but ranged between 38 and 45 p/l during the year), harbour dues at Guernsey of 0.44 p/l and the cost of shipping to Sark 6.7p/l[9]. I also allowed for the power consumed by the cooling systems in the power station (10%)[10] and the electrical losses in the distribution network (8%). This led to a variable cost of delivered electricity of 17 p/kWh. These calculations were shared with SEL in March 2018. I have revisited some of these assumptions, notably the on-cost from Guernsey to Sark, and the international price of diesel fuel has risen since the start of the year. Nevertheless, 17 p/kWh is a reasonable assessment of the cost of power delivered by SEL.

14. This leads to a total cost, wages, materials, services and replacement cost depreciation, of 50 p/kWh, if annual demand remains around 1,400,000 kWh. If the maximum price were set on the basis of preventing customers deciding to "self-supply" at 49 p/kWh, and annual demand remained at around 1,400,000 kWh, SEL would remain profitable. The depreciation charge allowed in SEL's accounts is smaller than my estimate, since SEL's is based on historic costs and does not allow for inflation to reflect replacement costs. Nevertheless, SEL's returns to shareholders would be considerably lower than it has enjoyed over the last decade. I do not believe it is fair that SEL's investors should have a "right" to returns. The company has faced a massive downturn in demand for its product and such reductions to shareholders' returns are only to be expected.

Larger scale renewable generation

15. Given the threat from renewable generation, I have considered whether SEL could lower its costs of generation and thereby provide higher returns to its investors. I have analysed the costs of both solar and wind generation. I have found that the average cost of electricity from "solar farms" of around 100kW, covering about half an acre each, would be around 10 p/kWh, somewhat less than the cost of running the diesels. I assumed that the panels will need replacement every 15 years, that the cells lose output by about 1% of their nominal capacity per annum and they will cost around £1/kWpa to maintain. I also assume that finance is available at 6% per annum, real.

16. Similarly, I found that the cost of a 100 kW wind turbine (standing 36-38m to the blade tips) is around £2,800/kW, after allowing for installation expenses[11]. If the wind pattern is similar

[6] See Consultation on Sark Electricity Price Control, Table 1, December, 2017

[7] See www.cummins.com for heat rates of lager diesels but increased by 10%, given their age.

[8] See www.ec.europa.eu/energy/en/data-analysis/weekly-oil-bulletin

[9] Private communication with Island of Sark Shipping Company.

[10] Estimate based on UK experience and conversation with SEL's management..

[11] Discussions with manufacturers, e.g. Norventos

to that on the mainland, one kW of wind capacity will generate around 2,190 kWh per annum. Again, assuming a 15 year life, and maintenance of £20/kWpa, and similar finance to PV, the average cost of power will be 14.0p/kWh. Additionally, second hand, refurbished and warranted, machines are available at far lower prices. These costings were also shared with SEL last March.

17. I also asked Narec-DE[12] to investigate the cost of such larger scale renewable generation on Sark. Narec-DE found that a much larger wind turbine (500kW) would cost £1,300/kW but would stand at 77m to the tip. After allowing for maintenance costs, I estimate that this particular EWT DW61 500 machine, could generate power for 7p/kWh, based on Met Office wind data from Guernsey Airport and from Weather Underground. However, such a machine would be difficult to install on Sark. Narec-DE also considered the potential output from a smaller, 100kW machine. Based on the same data from Weather Underground and the Met Office, NaREC found that such a machine would produce 346 MWh a year. This suggests a production cost, after allowing for finance and maintenance, of 9 p/kWh. Narec-DEC also found that 100kW solar farms would cost £100,000 and I calculate that they would generate at 9p/kWh, allowing for maintenance and finance costs.

18. Based on the NaREC estimates and my own research and calculations, it seems that SEL could reduce its costs of generation by around 8p/kWh if it were to use wind and solar power to displace its diesel generation. There would be a need to absorb the output from these variable sources with SEL's diesels as these new generators are installed. This would be similar to accommodating changes in customers' demand. However, as the proportion of renewable generation increased, there would be a need to install large scale batteries for when generation exceeded demand. These "system issues" are described in the Appendix.

19. In order to discover the upper limit on the costs of electricity supply on Sark, I asked Narec-DE[13] to estimate the cost of supplying electricity using only solar, wind and batteries on Sark. Based on building a completely new network, with 3,000 kW of solar capacity, the 500kW wind turbine and 24 x 300kWh RedT battery systems, each costing £130,000, they arrived at a figure of 58p/kWh, assuming the whole system was financed at 6% per annum real. This represents an upper limit on costs, as it would be cheaper to retain some diesel capacity to cater for long periods of still, cloudy days.

20. It appears to me that SEL would be able to reduce its costs if it embarked on a programme to replace its diesel generation fleet with renewable forms of generation.

Maximum Price Proposal

21. In the light of the above analysis and taking into account all the circumstances including the material considerations that must be taken into account under section 13(2) of the 2016 Law, I believe that a fair and reasonable price for electricity on Sark is 49 p/kWh, based on

[12] *Narec-DE*

[13] Narec-DE

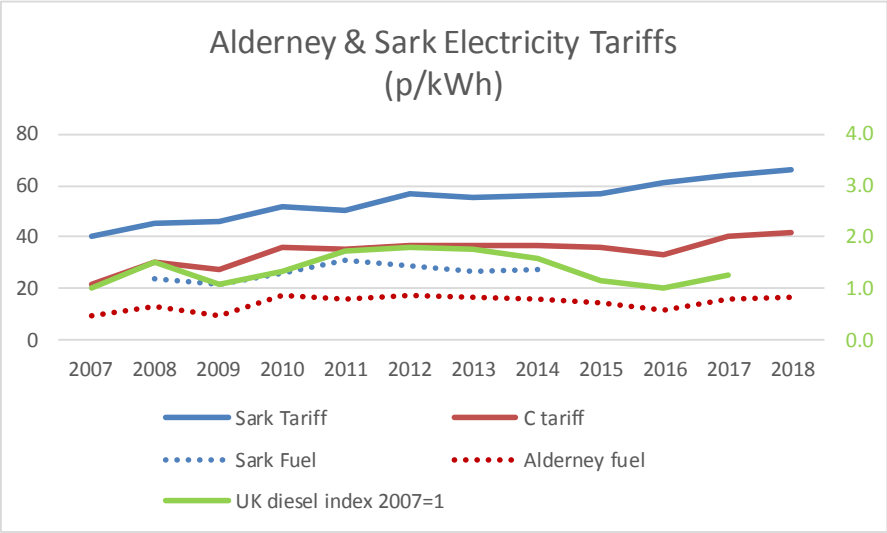
the average un-taxed diesel price quoted in Eurostat for the UK for 2018 of 46 p/l and a demand of 1,400,000 kWh. This should remove the threat of SEL's customers deciding to disconnect from the SEL network and will allow SEL to invest in lower cost forms of generation and provide a reasonable return to its investors.

22. However, I recognise that SEL needs to undertake a full study and analysis of alternative ways to generate power and raise cheaper finance and that it will need some time and resources to do that. Such a study will be able to identify the optimum rate of deployment of new forms of generation, the optimum number of diesels to retain and the amount of battery storage capacity. I therefore propose that, for the year from 1st July, 2018 to 30th June, 2019, the basic maximum price will be 52 p/kWh. That basic maximum price should enable some funding to be available for the study. It will also create an incentive for SEL to commission appropriate new plant as soon as possible, as it will help lower costs and so improve profitability.

Price Adjustments

23. SEL's average costs are sensitive to variations in demand and diesel fuel prices. I intend to alter the maximum allowed price in future years according to movements in both these factors. This will lower the risk to SEL's investors and enable the company to raise capital in the 5-10% per annum real range I proposed in the earlier consultation papers. The average monthly prices for diesel reported by Eurostat may not directly reflect the costs SEL has paid for diesel, given that the fuel is delivered to Sark. Nevertheless, I expect the price movements to be correlated. Indeed, over the past ten years, the price for fuel quoted by Alderney Electric, and SEL when it identified generating costs (2008-2014), have both correlated with the Eurostat figures, as shown in Figure 1.

Figure 1



24. If the average fuel prices reported by Eurostat over July 2018 to June 2019 are higher than 46p/l, then the maximum price for July 2019/20 will be adjusted to allow SEL to recover the shortfall suffered during 2018/9. The "under-recovery[f]" will be calculated as:

Under-recovery[f] (£) = ((Actual average price (£/l)-0.46)/2.93[14])*actual demand (in kWh).

25. Similarly, if the average price is lower than 46.0p/l, the over-recovery[f] will result in a lower maximum price for 2019/20, according to the same formula. These adjustments will be added to, or subtracted from, the basic tariff and the discrepancy equalised over the following year.

26. If demand is higher than 1,600,000, or lower, than 1,400,000 kWh during the year 1st July, 2018 to 30th June, 2019, a similar adjustment will be made to the tariff for 2019/2020. In this case the adjustment will be calculated as:

over-recovery[d] (£) = 36[15]*(Actual demand (kWh)-1,600,000)/100 and

under-recovery[d] (£) = 36*(1,400,000-Actual demand (kWh))/100.

27. This gives SEL full protection on the downside and allows it to retain all the benefit of higher demand up to 1,600,000 kWh. Rather than SEL running a surplus, or deficit, over the year, I am willing to consider proposals whereby adjustments would be made on a quarterly basis.

28. Should there be sudden, short term, movements in fuel price and demand, I have powers, under Section 15 (6) & (7) of The Law, to vary the Price Control Order.

Consultation

29. Under section 16(2) of the 2016 Law, before making or varying a Price Control Order, the Commissioner must consult with the supplier and may consult with such other persons as the Commissioner thinks fit. In order to enable that consultation to take place and to assist with the decision whether to make such an Order, I am sending a copy of this Proposal to SEL, the Policy & Performance Committee of Chief Pleas and respondents to my earlier Consultations. This proposal is also available on the web-site www.epc.sark.gg. I would like to hear, by 22nd June, 2018, from recipients of this Proposal, and any other interested parties, with their views on:

- The level of the maximum price for July 1st, 2018 to 30th June, 2019.
- The level of the maximum price for July 1st, 2019 to 30th June, 2020.
- The form and extent of the adjustments. and whether the adjustment period should be shorter than one year, and
- Any other matter they believe may be relevant to a Price Control Order.

[14] The 2.93 factor converts prices from £/l into costs per kWh delivered, taking into account the losses in generation and distribution.

[15] The 36 relates to the 33p/kWh fixed costs with 3p/kWh added to cover the cost of the engineering studies mentioned in paragraph 22.

30. If I make the Price Control Order, I am proposing that the maximum price will have effect on and from 1st July, 2018 for a period of 12 months.

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Appendix

System operation

1. The electricity generated by PV and wind generating systems would displace power generated by SEL's existing diesel generators. For small levels of renewable generation, the diesels will be able to cope with these injections of power in the same way as they cope with variations in customers' demand. Changing the output of the diesels will alter the amount of fuel burnt. However, this is not, necessarily, a linear process. If a diesel generator reduces its output by a half, the associated fuel consumption does not also go down by one half. The diesels operated by SEL were manufactured by Cummins and for outputs above half their maximum capability, the relationship between fuel burn and output is approximately linear. However, below this output, their efficiency falls. For this reason, SEL has to manage the scheduling of its diesel engines to ensure that each operating unit generates at an optimum output level. This involves anticipating demand.

2. The introduction of renewables would require SEL to anticipate the output from the solar panels and wind turbine in the same way as it anticipates demand. Indeed, battery storage would make it easier for SEL to optimise the operation of its diesels, even without the renewables. They could operate machines at the most efficient output levels for longer, with excess power being stored and used when other diesels are turned off or for when demand rises.