

Overview of SP Distribution Green Recovery PCB Submission

The EU Persistent Organic Pollutants Regulation (POP Regulation) was recast in June 2019 to require that “Member States shall identify and remove from use equipment (e.g. transformers, capacitors or other receptacles containing liquid stocks) containing more than 0.005 % (50 ppm PCBs and volumes greater than 0.05 dm³ (50 ml), as soon as possible but no later than 31 December 2025”¹.

DNOs were not provided with any specific allowances to fund PCB related activities in RIIO-ED1 and the EU POP Regulations were not implemented in the UK until May 2020. For similar reasons, there were no opportunities for DNOs to request additional funding through the RIIO-ED1 Mid-Period Review of Outputs. There are no other mechanisms available in the RIIO-ED1 framework to enable additional funding to be provided.

While deadline for compliance is the end of 2025 which falls into the RIIO-ED2 period, in order to meet obligations in 2025, there are clear benefits for some DNOs/DNO customers from starting activities in RIIO-ED1 to meet significant deliverability challenges. Note that the scale of increased asset changes required, and in particular pole mounted transformers (PMTs) changes, is not uniform across all DNOs with some DNOs facing much greater deliverability challenges than others if delivery of this mandatory activity is only fully mobilised in RIIO-ED2.

There is therefore a need for a new mechanism to enable some DNO activities to be brought forward from RIIO-ED2 into RIIO-ED1 to accelerate delivery in line with the 2025 deadline, and to reduce the economic impact of the peak activities in summer 2023 to December 2025 in terms of unit costs of equipment and contracting resources.

In order to help meet the UK’s December 2025 obligations, SP Distribution requests an additional allowance of £7.839m in 12/13 prices (£9.425m in 20/21 prices) under Ofgem’s RIIO-ED1 Green Recovery Scheme to begin to deliver the required outputs in the remaining RIIO-ED1 period. A detailed breakdown of costs and associated narrative is provided below the summary cost category table:

| Cost category | Cost £m (12/13) | Cost £m (20/21) | Included in BPDT |
|---|-----------------|-----------------|------------------|
| Asset replacement/refurbishment (inc. PMTs/GMTs, pole replacement where required) | £6.698m | £8.053m | Yes |
| Incremental Closely Associated Indirect (CAI) costs | £1.141m | £1.372m | Yes |
| Total | £7.839m | £9.425m | |

Please see accompanying file in RIGs format: SPEN - PCB Accompanying Table 3.0.xlsx – NOTE THAT THIS HAS TWO TABS FOR THE TWO PRICE BASIS (12/13 and 20/21) TO ENABLE COMPARISON WITH BOTH RIIO-ED1 and RIIO-ED2.

Impact on RIIO-ED2

The transformers identified to be replaced as part of the RIIO-ED1 green recovery funding will materially increase the probability that SP Distribution will deliver the removal of all PCB units from the system by the end of December 2025. Whilst the SP Distribution RIIO-ED2 submission proposed a volume driver to deal with the ongoing uncertainty about the total scale of the required mandatory programme, the relative volume of replacements in RIIO-ED2 will reduce due to the planned RIIO-ED1 delivery. The RIIO-ED2 submission was based on the range of PCB pole mounted transformer replacements required, ranging from 2,396 to 4,450, with a current best view of 3,423. The current best view represents ca 7 years of historic replacement volumes by SP Distribution for all purposes, whilst the worst case is ca 10 years. By starting the replacement program in RIIO-ED1, this will assist compliance with the legislation, while

¹ REGULATION (EU) 2019/1021 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 June 2019 on persistent organic pollutants (recast). UK Regulation -The Persistent Organic Pollutants (Various Amendments) Regulations 2019, SI 2019/1099.

having a positive impact on the RIIO-ED2 submission as by the start of RIIO-ED2, we will have a fully developed and efficient delivery program along with alignment with the procurement requirements from the manufacturers.

Asset Replacement

PMT replacement – Cohort Model

There is a significant number of PMTs on the DNOs' networks to test²/replace. Therefore using an industry statistical model (The Model) developed by the ENA, approved by the Environment Agency (via RPS 246) and supported by the Welsh (RD 083) and Scottish Environmental Agencies, all DNOs are sampling transformers based on manufacturer and year which are then categorised into cohorts. A number of each cohort will be tested; if a certain percentage of the cohort comes back negative, i.e. it does not contain PCB, it will be moved to 'green' and the transformers within that cohort do not need to be tested/replaced by the end of 2025 (i.e. they are statistically clean and can remain in service until their end-of-life).

The September 2021 model (consistent with RIIO-ED2 Final Submission) has identified the following number of PMTs needing replaced for the 2025 deadline, for SP Distribution.

| Category for PMTs | Volume |
|---|--------|
| Red plus Amber where cohort size is statistically too small to be useful (both categories to be replaced) | 2,125 |
| Amber (a sample need replaced to establish if cohort replacement is required or not) | 5,856 |
| Green (does not need replacing – with output of current cohort modelling) | 3,770 |

Note the output from the statistical model is that SP Distribution to replace a volume of pole mounted transformers ranging between 2,396 and 4,450, with a current best view of 3,423.

In the RIIO-ED1 period, in 2022/23, SP Distribution, propose to deliver the following volumes for the forecast costs shown:

| Activity | 2022/23 (12/13 prices) | 2022/23 (20/21 prices) |
|--|------------------------|------------------------|
| PMT replacement - Volumes | | 1,200 |
| PMT replacement - Costs | £4.005m | £4.815m |
| Replacement Poles / Additional poles - Volumes | | 730 |
| Replacement / Additional Poles - Costs | £1.417m | £1.704m |

In addition, there may be requirements to install or upgrade associated equipment at the time of the works which are not included in the efficient unit cost above, e.g. co-ordinated and efficient installation or upgrade of earthing to latest industry minimum standards, or upgrade of spur line protection to accommodate the additional capacity of uprated transformers (these activities do not have discrete unit costs in ED1 FD):

| Activity | 2022/23 (12/13 prices) | 2022/23 (20/21 prices) |
|-------------------------------|------------------------|------------------------|
| Earthing - Volumes | | 1,083 |
| Earthing - Costs | £0.879m | £1.057m |
| Protection upgrades - Volumes | | 120 |
| Protection upgrades - Costs | £0.159m | £0.191m |
| Pole refurbishments - Volumes | | 470 |
| Pole Refurbishments - Costs | £0.237m | £0.285m |

² PMTs are sealed units and in-service testing is therefore not possible. Testing is conducted on disposal by an Environment Agency licensed waste disposal contractor.

As part of the PCB replacement program, additional work will be required to ensure we maintain a safe a reliable service to our customers. The table above shows the additional activities required.

The uprating of the protection on the spur lines is needed as the larger size of the transformers may require the pole mounted auto sectionalisers to be upgraded from 20A S2 units to 40A S2 units. In some cases, when the connected capacity is greater than 380kVA, then we will require to erect either a pole mounted auto-recloser or a sectionalising Soule switch. The costs for this upgrade are based on the RIIO-ED1 submitted unit costs for PM Switchgear-Other, with volumes estimated at 10% of transformer replacement volume. We have not included the unit cost for a PM switch as we believe the volume would be insignificant to the overall program.

Other activities which are required and which are proposed to be delivered during the transformer replacements to reduce multiple customer outages are the two categories below.

As part of the transformer replacement, we will bring the HV and the LV Earthing up the current standard where appropriate. We will assess the Earthing at each location as part of the planning phase and where appropriate install new earthing prior to any customer outage. The expenditure is based on the current contract rates for the installation and testing of a new Earthing system. The volumes are based on the premise that when a pole is replaced the earthing will be upgraded as part of that pole change; also when the pole is not being changed, we will upgrade the earthing on 75% of the Transformer changes. It is worth noting that SP Energy Networks have undertaken a major compliance review of earthing systems and assumptions regarding soil resistivity. Following this research, SP Energy Networks has updated the secondary substation earthing specification based on calculations. This is in line with ENA TS 41-24.

We have also requested allowance for pole refurbishments. This is required for transformers where we are not replacing the transformer pole. To ensure a more resilient network, we will be looking to replace the glass or porcelain insulators with polymeric types as this is known to reduce the interruptions in supply for the customers fed from the overhead line. The allowance we have used is the RIIO-ED1 unit cost for a Pole Refurbishment.

Note that all of these additional cost categories are included in our RIIO-ED2 plan in our proposal for a PCB volume driver.

Additional Costs

| Activity | RY 2022/23 (12/13 prices) | RY 2022/23 (20/21 prices) |
|--|---------------------------|---------------------------|
| Incremental Closely Associated Indirects (CAI) | £1.141m | £1.372m |

Delivering this program of transformer changes is materially different to normal planned OHL investment programmes which are typically delivered on a circuit level basis. The transformers requiring replacement to comply with the new PCB legislation are widely spread over the overhead network and will in most cases need to be delivered as standalone activities. This will require a greater degree of surveying, customer liaison, live line planning and landowner communication to ensure safe and efficient delivery. In order to meet the volumes outlined, we will be required to appoint programme specific project management and coordination roles to ensure that we are able to deliver the programme within the prescribed timeframes.

These proposed closely associated indirect costs represent the incremental costs directly associated with the planning and the delivery of the PCB transformer replacement activities with the staff being utilised across areas of: Network design and engineering, project management, clerical staff and outage planners in the control centre. We have assumed that all other areas of closely associated indirect activities, and that all categories of Business support

activities required to deliver the programme can be managed within our business as usual processes, and have therefore not requested incremental costs in these areas.

As the detailed breakdown of information in this section is commercially sensitive, we have not included the details in this template, which Ofgem intend to publish; but we are happy to provide this separately if requested.

Deliverability in RIIO-ED1

Deliverability challenges have been considered as this proposal was being developed. The proposed work plan will not require any upgrades of the existing overhead line network, which minimises the requirements for additional land rights, and provides increased opportunity for utilisation of live line techniques to minimise customer impact. These factors remove significant barriers to delivery by March 2023.

SP Distribution will deliver this program with a mix of workstreams; the majority will be delivered via network outages. We also intend to deliver a number of units using the live line techniques via our own trucks and authorised staff; the live line work is limited to the smaller size of transformers due to weight restrictions on the lifting booms on the live line trucks.

These activities will be delivered with a mixture of in-house staff and our incumbent OHL contractors. We have engaged with our contractors to plan for these increased activities.

The efficiency of the program will be closely monitored, and we are ensuring that all outages take into consideration any other planned works on these circuits. The units we are proposing to deliver in RIIO-ED1 are on circuits that are not in the first 3 years of RIIO-ED2 modernisation program, so avoiding loss of co-ordination opportunities and minimising impact on customers.

The procurement of the pole mounted transformers is underway, with our current suppliers fully engaged with our procurement team on the required volumes for this program. This significant increase in activity in 2022 will reduce the peak of procurement of pole mounted assets in 2023-2025.

Full planning for the delivery of this program has commenced and early engagement with landowners and customers is recognised as a critical enabler of the successful delivery of this programme.

Future Proofing

When pole mounted transformers are replaced under this program, there is an opportunity to future proof the network by upgrading to a larger size to accommodate future load growth, expected to accommodate Low Carbon Technologies. There will be an immediate losses benefit.

The agreed approach is that DNOs will consider each transformer being replaced in the context of its Distribution Future Energy Scenarios, referenced in RIIO-ED2 plans, and will consider upsizing the transformer accordingly.

SP Distribution have assessed the existing transformer size and the volume of customers fed from each transformer. All 5kVA, 10kVA and 15kVA units will be upgraded to a minimum of 25kVA units. A number of the 25kVA transformers will be upgraded to 50kVA. No pole mounted transformers will be changed to ground mounted as part of the Green Recovery funding submission, and no 11kV overhead spur line upgrades from single phase to three phase will be delivered as part of this programme due to the significant cost and deliverability complexities (i.e. change of land rights and impact on customers).

Delivery of this proposal is estimated to deliver ca 17,000kVA of additional transformer capacity for use by our customers for adoption of LCTs. This equates to ca 2,400 7kW EV chargers or ca 1,300 13kW heat pumps (assuming no local diversity in demand).

Targeted volume of intervention as informed by the SPEN-led ENA statistical model will reduce the costs and outages to the customers.

The delivery of this proposal in the remainder of RIIO-ED1 will deliver the following outcomes and benefits:

- Compliance with environmental regulations, i.e. PCBs removal by 2025. A significant delivery challenge is noted, which is compounded if the delivery is delayed until the start of RIIO-ED2. Starting the program in RIIO-ED1 will ensure SP Distribution meet the deadline, while reducing environmental impacts.
- Delivery in RIIO-ED1 with subsequent delivery in RIIO-ED2 will smoothen the profile, mitigating any supply chain bottleneck issues that will inevitably result in cost increase.
- No-regrets strategic upsizing of the PMTs to be replaced will facilitate LCT uptake, with demand 26% higher in 2030 and double by 2050 in line with SPD Distribution Future Energy Scenarios (DFES)³. Strategic upsizing of PMTs will reduce the need for re-interventions in RIIO-ED2 or beyond, particularly pertinent for off-gas grids. Figure 1 shows the forecast electric vehicle uptake in the SP Distribution licence area.

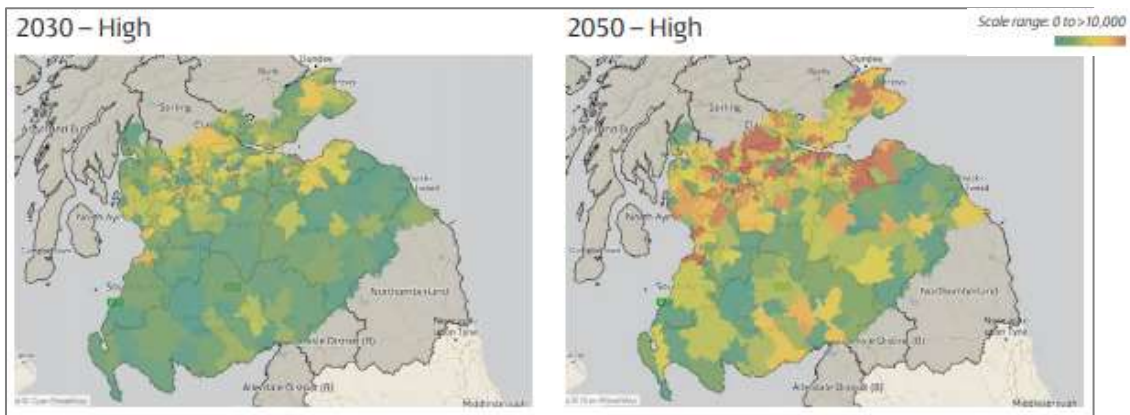


Figure 1: SPD DFES – forecast residential EV uptake

- Use of more modern transformers that comply with the Ecodesign Directive⁴ will also reduce the network losses. The new directive aspires to increase the degree of effectiveness by 20%, which will reduce SP Distribution’s carbon footprint.
- SP Distribution will use overhead line contractors to deliver this challenging program. The increased activity in RIIO-ED1 will direct growth opportunities for our service partners, promoting retention and growth of skilled talents as part of the green economic recovery, developing skills and resources that will be needed more widely in the low carbon transition.

RIIO-ED2 Deliverability and Efficiency Challenges

The potential scale of PMT replacement programs faced by some DNOs could present significant delivery challenges in RIIO-ED2 which are also likely to present as upwards pressures on costs, whether this be from competition for overhead line contracting resources or increased demand on equipment manufacturers.

Accelerating a proportion of the industry PMT replacement program into RIIO-ED1 will reduce pressure on input costs for all DNOs by smoothing the industries delivery profile and reducing the peak demand on manufacturing and contractors during a more concentrated period (April 2023 – December 2025).

³ SP Distribution Future Energy Scenarios, SP Energy Networks, December 2020.

⁴ Regulation (EU) 2019/1783 on Ecodesign Requirements for Small, Medium and Large Power Transformers, Official Journal of the European Union, L 272/107, 25 October 2019.

SP Distribution have a significant volume of PCB transformers to remove from the system before the 2025 deadline, the best view is equivalent to up to 7 years of historic replacement rates for all other reasons, rising to 10 years under the high scenario. This programme needs to be delivered on top of replacements for all other reasons including forecast increases in RIIO-ED2 arising from customers adopting EVs and Heat Pumps. The early start to this will assist in the deliverability of the full RIIO-ED2 program and will reduce a peak of activities in 2023-2025, which will inevitably lead to increased pressure on the manufacturing chain and contracting resources, which will manifest as an increase in prices.

A key challenge to this program is the supply chain for the pole mounted transformers with all the DNOs looking to procure units. The suppliers must increase production to meet this extra demand. An early start to the delivery will assist in this by allowing the manufacturers to increase production over a longer period of time and reduce their required peak production capacity, which will result in a relative reduction in supply costs which could be of benefit to all DNOs.

If the full program is delayed until the start of RIIO-ED2, then this will have a significant impact on the deliverability as we will be starting a new program of works with the delivery of all the units over 33 months. If we are to deliver 3,423 units over this period then, we will need to deliver over 6 units every working day along with the other OHL investment programs. This will also have an impact of the supply chain with manufacturers ability to produce and deliver the required volumes for each DNO severely limited.

We have omitted reference to RIIO-ED2 unit costs and input prices as the Final Determination is pending. However, it is of note that the industry has seen price increases above Retail Price Index on pole mounted transformers in recent years, and if this was to continue through 2022 to 2024 there will be a material benefit arising to customers from the early delivery of this component of the PCB pole mounted transformer programme. As this information is commercially sensitive, we have not included the details in this template, which Ofgem intend to publish; but we are happy to provide this separately if requested.